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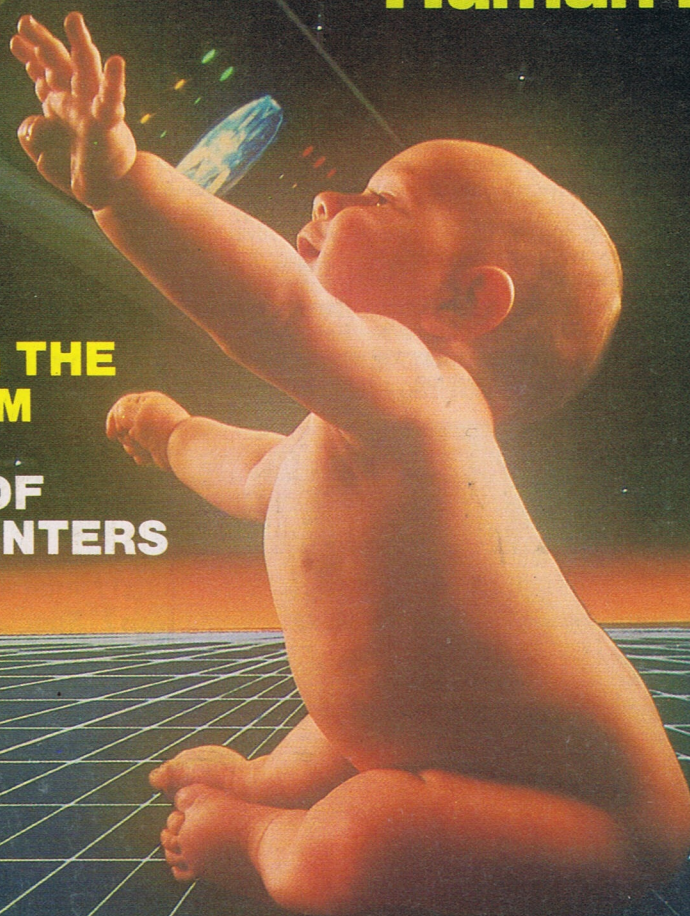
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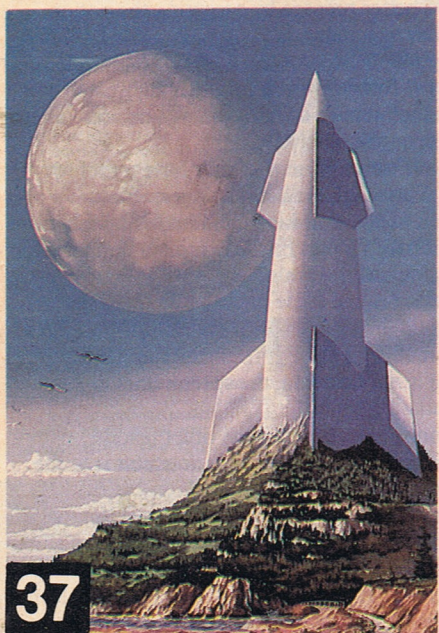
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**ON THE COVER:** Cory Cooper agreed to represent the next quantum leap in intelligence, as photographed by Michael Sullivan. For more about tomorrow's minds, see page 19.

## Not So Alien After All

Our Tomorrow columns ought to be collected and kept in a Museum of Futurist Thought. Tomorrow is the way we *end* each issue—by turning a famous thinker/writer loose and saying, “speculate!”

This issue, “Aliens I Have Known” by Gregory Benford is my favorite kind of Tomorrow column for two reasons: first, it is filled with fresh, new ideas and information, certain to provoke hours of discussions: and second, I disagree profoundly with one of the main premises of the article.

Mr. Benford speculates that in the future we might encounter intelligent life forms that bear *no relationship* to ourselves, and that we'd better prepare by accepting the notion that there are things in the universe which are *unknowable*.

*My disagreements are based on the nature of intelligence.*

If we visit planets with plants and lower animal forms, we will find that they have automatic life functions, living and growing as their nature directs, without choices. They will live and die as they do on our planet—more or less passively.

But if we visit a planet with *conscious* creatures we will find that they have a tool for active survival that is more powerful than any amount of shells and stingers. Consciousness provides the organism with *awareness* of the world in which it lives by means of a system of sense organs that feed information into a part of the organism designed for data evaluation and direction of actions—what we call the brain.

It doesn't matter if the creatures have one broad-range sense organ or 23 (each detecting a narrow category of data); the purpose of the mechanism is to collect information *so that the creature does not bump into walls or walk off a cliff!* If the sense mechanism is accurate, the species survives; if the mechanism is *not* accurate, the species does *not* survive. It's that simple.

If we find conscious creatures who do *not* communicate with each other (except, perhaps, with primitive grunts) then we will understand that their consciousness is at the sensory/perceptual level—like a deer or a rabbit. If, however, they communicate with language—no matter how alien—we will understand that their consciousness is capable of concepts. Language is a system of abstract symbols, and if they have a language at all, then they can think and learn—they are intelligent.

These new creatures may be green or aquatic or one foot tall, they may “hear” colors or “smell” vibrations, they may live in dwellings we cannot even imagine, and they may communicate by *methods* we cannot now comprehend. But if they talk and think *in any form* we will have something very important in common with them.

Intelligence may seem like a tiny attribute to share, but it is a gigantically important universal faculty when it comes to understanding alien species. We may have to draw pictures in the sand, point with our fingers, translate via computers, whatever—*eventually* we will be able to grasp all the fascinating differences between our races and our worlds.

They may be able to “see” things we cannot (like radiation), but we can build devices that tell us what we need to know about anything that we cannot sense *directly*. And they can do the same.

Whatever exists has real properties, and our system of consciousness is designed to understand existence. If the mechanism were ineffective, we would not be here. Whatever exists is knowable.

It may seem fun to propose grand mysteries that are beyond our comprehension—like the romance of UFO's and ESP and ancient astronauts and alien encounters so bizarre that bilateral symmetry and opposing thumbs (fundamental to our brand of life) are nonexistent. But reality does not change rules from one solar system to another. *Nature* and all the specifics may be different, but reality is constant and dependable.

I propose that future encounters with alien races will not expose us to unfathomable mysteries and the limits of our puny brains, but will further the *proof* already begun on this planet that nothing in existence is *unknowable*—merely *unknown* at present.

What awaits us, as we meet new neighbors in the universe, is the knowledge of how much we are capable of understanding—not our limits but our limitlessness.

Kerry O'Quinn/Publisher

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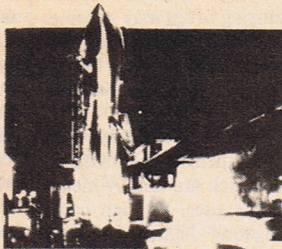
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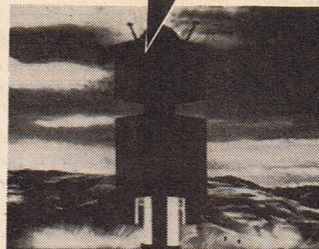
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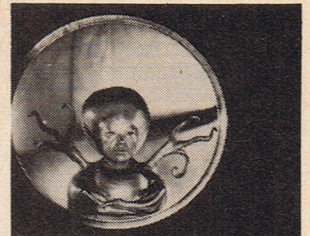
### "ROCKETSHIP X-M"

Color tinted—Starring: Lloyd Bridges, Osa Massen, Hugh O'Brian, Noah Beery Jr., Morris Ankrum. First screen story dealing seriously with man's flight to another planet. A landmark adventure, directed by Kurt Neumann; music score by Ferde Grofé. (Original 1950 version.)



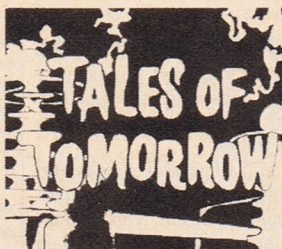
### "KRONOS"

B/W—Starring: Jeff Morrow, Barbara Lawrence, John Emery, Morris Ankrum. A flying saucer crashes into the ocean, and a giant robot, capable of draining all Earth's energy, emerges. Atomic bombs are useless as it approaches L.A.



### "INVADERS FROM MARS"

Color—Starring: Arthur Franz, Helena Carter, Jimmy Hunt, Morris Ankrum. Young boy is unable to convince townspeople he has seen flying saucer land in backyard. One by one, his parents and others are "taken over" by invading aliens. Classic cult movie directed by William Cameron Menzies.



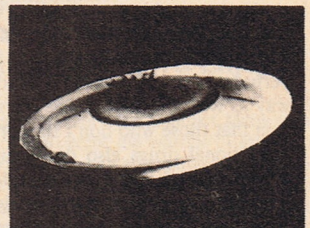
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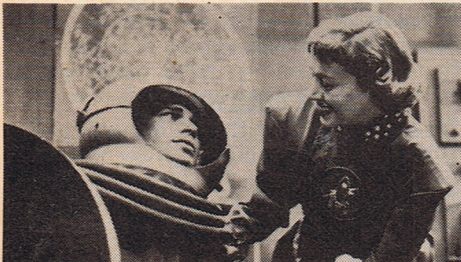
### "FLIGHT TO MARS"

Color—Starring: Cameron Mitchell, Marguerite Chapman, Arthur Franz. An expedition crashlands on the red planet and discovers an advanced underground civilization. Beautiful special effects, matte work! Produced by Walter Mirisch.



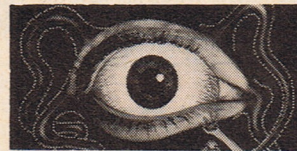
### "THE FLYING SAUCER"

B/W—Starring: Mikel Conrad, Pat Garrison, Hanz Von Teuffen, Virginia Hewett. A huge saucer, hidden under a glacier, is the subject of search by U.S. and Russian scientists. This was the first film dealing with flying saucers and was reviewed by FBI before they allowed its release.



### "SPACE PATROL" Vol. 1

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B/W—Starring Ed Kemmer as Buzz Corry & Lynn Osborn as Cadet Happy, with guest stars. Set in the distant future, this sensational adventure series was one of the longest running and most popular of early TV, with the Space Patrol braving weekly dangers ("live" from Los Angeles) to keep interplanetary peace. Included: Early 15-minute episode, prior to Buzz Corry's emergence, plus two 30-minute episodes with commercials, "Mystery of Planet X" and "The Trap on Planet X."



### "THE CRAWLING EYE"

B/W—Starring: Forrest Tucker, Janet Monroe, Jennifer Jayne. A chilling SF terror tale of a shimmering alpine fog that contains deadly creatures from another planet. Victims are found decapitated; tremendous tension! Released in England as "The Trollenberg Terror," with music by Stanley Black.



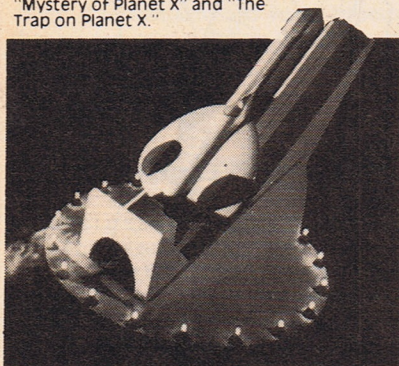
### "HIDEOUS SUN DEMON"

B/W—Starring: Robert Clarke and Nan Petersen. A scientist at an atomic lab is accidentally exposed to radiation which turns him into a grotesque killer reptile when sunlight hits him. A real gem of "camp" horror!



### "STRANGER FROM VENUS"

B/W—Starring: Patricia Neal, Helmut Dantine, Derek Bond. A benevolent (but frightening) being from space lands to warn Earth and pave the way for arrival of "mother ship." Never released theatrically in U.S., this is essentially "The Day the Earth Stood Still" redressed. Historical! Fascinating!



### "TOM CORBETT—SPACE CADET" Vol. 1 (3 episodes)

B/W—Starring Frankie Thomas as Tom, this series became gigantically popular in early 50s, playing on four major TV networks, with a radio version, a comic strip and numerous merchandising tie-ins. Based on Robert Heinlein's book *Space Cadet*, the series had rocket expert Willy Ley as tech advisor. Includes: "Ace of the Space Lanes" & "The Martian Revolt," plus premiere 15-minute episode, "At Space Academy." (Commercials & Trailers)

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## BUMMER

... The article by Norman Spinrad in FUTURE LIFE #19 on drugs of the future was one of the most incredible things I have ever read in my life. Norman is a cinch as this year's winner of the coveted "Rose Colored Glasses" award.

There is no argument about Norman being an excellent writer, as this piece was extremely well written. In fact, it was so well written that I sincerely doubt that many of those who agree with his position were able to understand what he was saying. Norman is very easy with tossing out generalities without attempting to back them up, so perhaps I may be excused if I indulge myself this way as well. Norman draws the stunning conclusion that those who don't support the concept of recreational drugs also don't support space exploration, and that those who do support space travel and read SF are invariably drug oriented. Now I could say that I'm an example of the opposite, but that would serve no purpose because there are always exceptions except in the case of the most stringent tautology. So instead I'll proffer another generality, one which I think will have more evidence to support it than any of Norman's. What might that be? That the rise in the use of recreational drugs corresponds to the decline in literacy of the average individual in society today. Norman tends to gloss over any bad side effects of drug use and ignore the fact that many so-called recreational drugs actually inhibit the thought process and fog the brain. Case studies are showing increasing evidence that marijuana use among teenagers actually inhibits their learning abilities. This is not something that should be glossed over or ignored.

Regarding how wonderful a future of people who used drugs all the time would be, I direct you to Norman Spinrad's own 1971 short story "No Direction Home" in which he portrays just such a future (see *The 5th Annual Best SF: '71* edited by Harry Harrison and Brian W. Aldiss) and it's a pretty grim picture. The entire point of the story is that these people freak out when they stop taking the drugs and attempt to see what reality is like without them, and they quickly retreat into their drug-colored world because they are psychological cripples who cannot function without their drug altered perceptions. This is a far more realistic portrayal of this sort of culture than the one Norman attempted to conjure up with a sense of wonder in the Tomorrow section of FL #19.

James Van Hise  
San Diego, CA

## NATURAL HIGHS

... Concerning Norman Spinrad's article on "psychoactive" drugs in issue #19: What the author is overlooking is our innate ability to achieve "altered," or higher, states of consciousness *without* the use of artificial aids of any kind.

Ignorance, laziness and impatience are the primary reasons for relying on chemicals to produce results attainable *naturally* after a certain period of

practice and self-discipline. No matter how "safe" these consciousness-changing drugs may become, they only serve to lead one down the primrose path of self-deception in allowing that person to believe he or she has had some kind of wondrous transcendent experience.

Psychoactive drugs encourage the mind and lower faculties to preoccupy themselves with dazzling sensory phenomena which are usually meaningless and discourage the user, through complacency, from investigating higher levels of awareness attainable *only* through natural methods. Those users fortunate enough to escape physical harm often become unbalanced emotionally and mentally as they turn inward on themselves and begin to neglect the responsibilities of their daily outer lives.

Richard J. Grasso, Jr.  
Loring Air Force Base, ME

## ESP, HITLER AND CLEAR MINDS

... In past issues of your magazine you have endorsed parapsychology, consciousness expanding and now drugs. I think it's time now that I speak my piece against these things.

The basic problem with all parapsychology and consciousness expanding methods is that it mixes good and evil in the spiritual realm. This is to invoke what *Star Wars* fans would call the dark side of the Force. The so-called benefits of these things have not been proven by science and it's my belief that science will prove that these ideas are dangerous to our mental health.

As to the use of drugs, the medical evidence of the past centuries will not be changed in the future. Drugs, like parapsychology, is involving the dark side of the Force with terrible results. If you don't believe me I suggest you look up the life of one Adolf Hitler. Also the effect of drugs will not be changed now or in the future. We do not have the knowledge or ability to create new states of consciousness to order that are safe. This condition will

not be changed now or in the near future by anyone.

In closing I would say we need clear minds in order to build a worthwhile future for ourselves and our loved ones. Drugs, parapsychology and consciousness expanding are dead ends that will bring disaster on all who are a part of it.

Vernon Brewer  
Derry, PA

## TRIP TRIPE

... Norman Spinrad's statement that "2001 owed much of its box office success to drugs" rates as one of the most stupid comments I have ever read (FUTURE LIFE #19). If Mr. Spinrad bothered to see programs on drug abuse, he would see his so-called "raised consciousness," the slurred speech and the glazed eyes of human wrecks.

Drugs do not "raise the consciousness," Mr. Spinrad, they work the mind into hallucinations and turn people into living deaths slowly dying day by day. I should think America has enough problems with drug abuse without FUTURE LIFE promoting it through irresponsible people like Timothy Leary and Norman Spinrad.

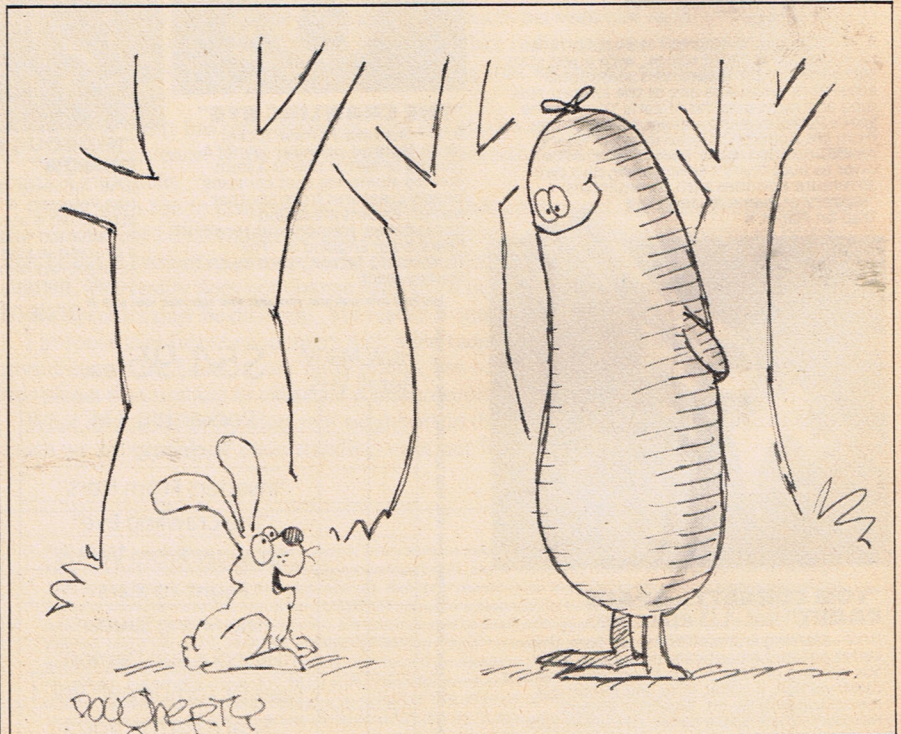
I just wonder how many people will die because of their promotion of drug taking. "Raised consciousness" indeed, what crap! You don't need drugs for that and they are silly for believing that chemicals could do it.

A. Watson  
Palmyra, West Australia

## NOT FUELISH

... As one of the SF writers criticized by a reader in FUTURE LIFE #20 I would like to reply that my advocacy of nuclear power, far from being a result of "blind acceptance," is based on my perception of the real issue at stake beneath it all, which is seldom debated publicly.

The energy *densities* attainable from nuclear



"Not the missing link?"

processes set them apart from all of the so-called alternatives in being thousands of times greater than anything produced by rupturing chemical bonds or from solar, which arrives diluted down by 93 million miles' worth of the inverse square law. This fundamental difference offers not merely abundant power, but also opens up a whole realm of revolutionary technologies for supplying cheap raw materials of all kinds, primary metals, fresh water, foods, synthetic fuels and economic process heat for a whole spectrum of industries. In short, nuclear power offers humanity its opportunity to escape from the Malthusian economic spectre of a mushrooming population squabbling over an ever-diminishing reserve of finite resources, and of raising living standards globally to a level comparable to that of the West today. If the world continues to accept the myth of finite resources it will eventually fight over them all the way down to the last barrel of oil, and when the shortages become acute enough the fighting will escalate accordingly. At the end of the line, therefore, the only alternative to nuclear reactors is nuclear bombs. Which do the environmentalists consider safer?

Nukes are the safest and cleanest sources of energy so far developed; more people are killed on bicycles every day than have been hurt in over 20 years of reactors, and an estimated 3,000 deaths per year in this country are attributable to the effects of burning fossil fuels. But, as has been true throughout history, the notion of an affluent and truly free society clashes with the interests of its traditional power-structure, since to preserve a privileged nobility you must sustain an underprivileged and hard-working peasantry, at the same time manufacturing schemes to siphon off the surplus wealth that results from increasing productivity and soaking it up perhaps by building pyramids, medieval cathedrals, or embarking on arms races (the U.S.A. spends money on defense at the rate of \$60 million per hour; if it stopped spending for four hours, everybody in the country could be a millionaire).

The current manipulation of public opinion against nuclear power, as exemplified by the hysterical distortions of fact that attended the "reporting" of the Three Mile Island incident, and the enlisting of movie stars and other eminent authorities to spread the gospel, thus begins to make sense, even if it is insane. Ironically the anti-nukes are being duped and recruited by the very forces of centralization and vested interests that they are persuaded to believe themselves fighting against.

James P. Hogan  
Altamonte Springs, FL

### COLONIAL CONFORMITY

...After reading Gerard O'Neill's article in FUTURE LIFE #10 and hearing him speak at Stanford, I have a comment to make.

While I like Dr. O'Neill's concept of small, independent space colonies free to develop into diverse cultures, and really want to see it realized in my lifetime, there is a drawback to it. The original settlers get to choose the society they want to live in, but their grandchildren don't. If the colony decides to cut itself off from the rest of humanity, those who don't fit into the local culture will have no way to escape from it. What will happen to the young person born in a narrow-minded fundamentalist colony who discovers that he or she is gay? What about the son or daughter of farmers in an agrarian, back-to-nature society who wants to

learn to program those robot ships repairing the colony's mirror? What of the woman living in an all-female colony who really wants the company of men?

Small, isolated societies are great for producing cultural diversity, but I hope they won't eliminate individual freedom.

Bob Kanefsky  
Stanford, CA

Gerard O'Neill replies: *The problem you raise is based on a misunderstanding. It's quite true that there's a diseconomy of scale in space colonies, so that there are likely to be many small ones rather than a few big ones. They can easily be self-sufficient for energy and food, and they may (and I hope most will) choose to be independent and small-scale in their governments. But they need not be isolated; quite the contrary. Both communication and travel will be easy between colonies, except for those few that may have become trapped in authoritarian governments. People who find themselves very much at odds with the culture they're born into will either succeed in changing it or will leave it. Here on Earth it's common for such people to end up in cities where they find others who share their tastes, and I expect there'll be some city-like agglomerations of colonies into cosmopolitan centers in space also.*

### MEATHEAD

...The best that Carolyn Henson can come up with, aside from calling names, is topless dancers, booze and loud music (FUTURE LIFE #18). Hardly a good argument for eating meat in space or anywhere else. She is also gratuitously offensive to cover her poverty of argument.

I'm going to have to write to NASA and find out what really did happen at that conference. That "sludge might win" doesn't inform me or anyone else what happened there.

Milton Monson  
Oak Brook, IL

### SPACEY SECURITY BLANKET

...Regarding your Future Forum on public interest in space (FUTURE LIFE #19), it seems the space program needs a goal that is attainable but challenging, worth the expense and able to fire the imagination of the American people. I believe such a goal could be the construction of a space-based, anti-ballistic missile system using high energy lasers or charged particle beams.

Nuclear war is a predominant fear in today's world mainly because the intercontinental ballistic missile is perceived as an ultimate weapon against which there is no defense. Cruise missiles and bombers aren't in the same class symbolically or substantively. Defenses against the latter are more effective since they are slower and remain within the atmosphere.

Treaties to limit the ICBM do not seem viable given the fact that historically treaties have an almost 100 percent mortality rate. If the ICBM is such a horrible weapon, technical countermeasures seem to be the only sure safety over the long run. The expense would seem worthwhile since, after all, we are talking about the survival of civilization.

Events in the Middle East and Afghanistan show how fragile super power relationships can be. U.S. and Soviet forces haven't exchanged a shot, yet the strategic arms limitation talks seem to be in jeopardy. Future political crises seem certain and there are doubts about the Soviets' real intentions while



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detente and the SALT talks continue.

The United States retains a lead in aerospace, computers and particle beam technology needed in a space-based ABM system. The army, navy and air force are all conducting research on directed energy weapons.

A U.S. commitment to build such a system within a specified period of time could give purpose and direction to the space program for years. It may involve space shuttles, large space structures, manned space stations and large satellites.

If other powers feel compelled to compete this may permanently push man into space. What country would dare withdraw its ABM space facilities first? An extensive technological base for civilian space activities would be established. This pattern is similar to the development of the new world centuries ago.

A space ABM project to neutralize the ICBM might also stimulate American idealism. America might feel it is embarking on a crusade to make the world safe for civilization with American know-how. It might also become possible to consider unilateral reductions in ICBM forces, not to mention the multibillion dollar MX missile system. A space ABM may provide the security for these things to happen. The constant search for first strike capability, counterforce, assured destruction, etc. could be moved from Earth's biosphere into space. If militarism can't be stopped, perhaps it can be placed into a different context where there is less harm to life.

Why not try solving some problems of security and national malaise with a revived space program taking part in such a project?

Joseph Sprezinski  
Portland, OR

## ALTERNATE ASTRONAUTS

... In reference to your Alternate Space artist in FUTURE LIFE #19:

Even though it is a great idea to offer space to everyone, everyone who wants to go can't. NASA has a point in that even the broom pushers will have a PhD; however I feel as you do that all people should have the chance to go out. Still, since space will be at a premium on the shuttle for years to come, most space workers will have to be very flexible job-wise.

Also, I know of a few people who want to go into space as badly as I do, yet I'd be afraid to let them handle a car let alone a space tug! If a space job lottery were held there would still have to be psychological tests and checks to weed out those who couldn't cope.

Another thing: If we pull out of the '67 space agreement (I agree with you on the '79 Moon Treaty), what is to prevent some nut from taking off for the asteroids in a modified space tug with several green plants and a TRS-80 for a computer? There will be a need for some type of control, not so much as the '79 treaty suggests but some still the same.

Randy E. Campbell  
Eglin Air Force Base, FL

## OUR OWN SPACE

... On behalf of the Viking Fund I would like to thank you and your magazine for running an article on our worthy project in FUTURE LIFE #18.

We are able to reach more and more of the public through these types of articles and donations are coming in daily. We continually get letters of support for our project which shows that the public

really does care about our space program.

Kit Weinrichter  
American Astronautical Society  
Menlo Park, CA

## PRO PROGRESSIVE MUSIC



... Thank you for "Meet the Residents" (FUTURE LIFE #19). The intelligent music of the future is finally being recognized! Here are some suggestions for future articles on this progressive music: MX-80 Sound, Tuxedo Moon, Ultravox and The Stranglers.

Thanks again. Only an intelligent magazine like yours could print such a fine article.

Mike Parker  
Severna Park, MD

## SEA CITY, SI

... I have just finished the article in FUTURE LIFE #18 on Sea City and I think it was fascinating. However there are a few things I would like to comment on. First, I do not think that the recovery of gold from the oceans is commercially viable as the extraction process costs more than conventional mining methods. The second is that the plans for Sea City call for the use of vast amounts of steel-reinforced concrete for the pilings, deck and cells, and such amounts are impractical. Limestone and gypsum are growing more scarce and so driving up the cost of concrete. Also the steel in the concrete will corrode and will cause it to fracture.

But for this problem there is a solution. In another well known magazine there was an article on a process discovered by a professor, Wolf Hilbertz from the University of Texas. He found that by electrolysis, a wire mesh emerged in sea water would attract the minerals in the ocean. These calcium carbonate compounds will soon cover the wire and will continue to build up as long as the current is running. This substance will withstand pressure of more than 4,000 pounds per square inch. That is stronger than concrete yet it is much lighter. I believe that if the Pilkington Glas Company uses the Hilbertz process they can start

building their Sea City right now and at half the cost.

Terry Watson  
Silver Valley, Alta. Canada

## TITANIC MYSTERY

... Can someone please explain why Stanley Donen's new production is called *Saturn 3*? In FUTURE LIFE #17 it clearly states that the film is set on Titan, "third moon of the planet Saturn"; the title bears out the "third" and Titan is mentioned elsewhere in the article. Yet Titan is *not* the third but the seventh moon of Saturn (or even the eighth, if we accept the one inside the orbit of Janus). ...?

Lawrence Keene  
Birmingham, England

*Guess that's why they call it science fiction.*

## BRITISH BLOOPER

... With reference to Pat Glossop's article "The British Connection" (FUTURE LIFE #18), I think it should only be fair to state the case with regard to the independent television companies in the UK. To begin, we have 15 independent television companies "watched-over" by the Independent Broadcasting Authority which also owns the transmitters the independent companies use in the transmission of their various programs.

The BBC, on the other hand, has two channels, BBC 1 and BBC 2. Usually BBC 2 is devoted to the documentary/arts/technology/science program. But when a science-based or natural history program is sure to gain a vast audience (something like 18 million people), programs such as *Life on Earth* and *Tomorrow's World* are shown on BBC 1 at peak viewing time.

But what, you may ask, of the programs offered by the independent networks? Programs such as *Discovery* and *Disappearing World* are, in all fairness, as good if not better than BBC offerings. The mistake you have made in the article is to treat the BBC as the only television supplier available. Very probably, American audiences (when they see a British program) think immediately of the BBC. This is wrong, but it is our fault for not making the situation clearer.

Aldo G. Rabaiotti  
West Glamorgan, South Wales

## INTERESTING TIMES

... Publisher Kerry O'Quinn's comments in the Output column of FUTURE LIFE #19, "Escaping 'Utopia,'" seem very similar to a quote attributed to George Bernard Shaw: "The reasonable man adapts himself to the world, the unreasonable man attempts to adapt the world to himself. Therefore all progress depends on the unreasonable man." I agree with that.

But there is also, I understand, a Chinese "curse" which states something like: "May you live in interesting times." In quiet times when life goes on normally and agreeably, not much occurs out of the ordinary. "Interesting times," as when "heroes" and interesting events occur, tend to be unsettled times of trouble.

The world is troubled from time to time, and leaders or "heroes," movers, are useful to help get it back in better shape, but it should be kept in mind that "heroes" and trouble go together, and that pleasant and peaceful time are usually quiet times.

Philip Chrystol Henderson  
Spring Hill, WV

# database

## WEIGHT WATCHERS

### GRAVITY CRISIS

Don't say that you haven't been warned. Oil shortages, environmental problems and nuclear catastrophes are nothing when compared to the ultimate non-renewable resource that is rapidly being dissipated... gravity.

The warning is being sounded by Darwin Crum, an electrical engineer in Schaumburg, Illinois. "We're wasting man's most precious terrestrial resource," he maintains.

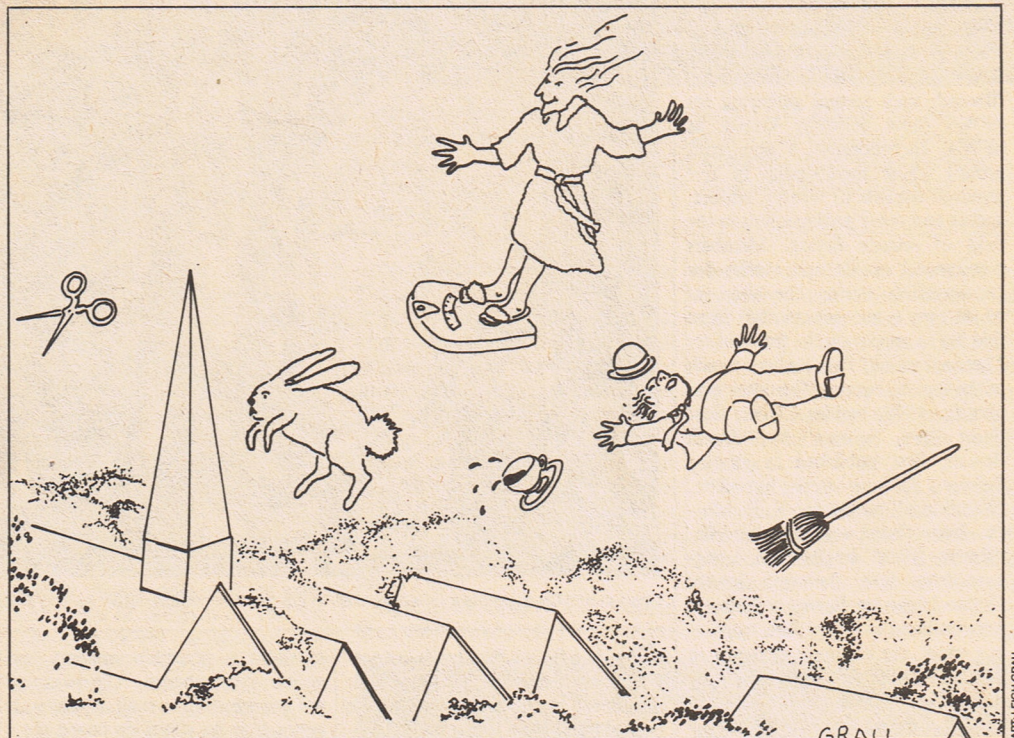
Now, admittedly, the idea of gravity being a threatened resource is a heavy trip. And if you've never weighed the possibility you probably don't appreciate the gravity of the situation which, according to Crum, has been... er, decreasing for quite some time.

"Egypt," notes Crum, "was the flower of civilization until they started piling up heavy stone blocks. Now there's nothing there but a damn desert."

"Or the Greeks. They were doing fine until they decided to roll tons and tons of marble up a hill and put up the Parthenon. Now the only thing we have from the Greeks is olive oil and Spiro Agnew."

Crum now thinks it's America's turn, calling the giant Sears Tower "a monument to man's abuse of gravity." After all, he points out, "It has 103 elevators going up and down all day, and a population of 16,500. If they only commute halfway up, that's the equivalent of eight Mt. Everest expeditions a day in terms of gravity consumption. Not counting going out to lunch."

Crum is also very concerned by O'Hare Airport where he maintains that stupendous amounts of gravity are expended to bring all those planes down to the ground. Between the air-



port and the world's tallest building, Crum makes it perfectly clear that Chicago is the world center of gravity abuse.

The heavy-thinking engineer sees dire consequences in our misuse of gravity. "Do you have little children? When gravity starts disappearing, one day you'll ask, 'Where the hell is Billy?' And your wife will say, 'The last time I saw him he was floating west.'"

Small animals, of course, will go before that. "Birds will have to fly upside down," he warns.

Finally he gets to some really important matters. "What's going to happen to the brassiere industry?" he asks. "First the straps will become

superfluous, then they'll have to put the straps on the bottom. I predict that the business will sag badly and eventually head for a bust."

Which brings him around to the subject of sports. "Basketball is the worst. Bouncing that ball up and down... these guys are seven feet tall to start with and then they heave it into a net ten feet up!"

There are some definite down-to-Earth solutions, however. "I wrote to President Carter," he says, "that his failure to include airplanes in the 55 mph speed limit is a gift of gravity to a few selfish individuals in the airline industry. I asked for an immediate ban on air freight until new legislation goes through."

"I'm also asking for a reduction in the ton to 500 pounds."

And he has also founded the American Society for the Conservation of Gravity. Members receive a bimonthly newsletter, a certificate of membership, an identification card... and a gravity status indicator. The indicator is a metering device with an arrow.

"As it approaches zero, we suggest you tape the meter to your desk and bolt the desk to the floor," he says.

For those of you who refuse to take this situation lying down, the society's address is: P.O. Box 94486, Schaumburg, IL 60194.

Just don't use air mail.

—Philip L. Harrison

## PLUG-IN

### ELEKTROMUSIK, INC.

Are you an electronic music freak? Do you want to further the cause of electronic music as both an art form and a science? Then you'll be glad to know about an organization dedicated to that worthy cause: the International Electronic Music Association.

Founded in early 1979 by Jim Finch, the IEMA boasts as members some of elektromusik's more illustrious avant-garde artists, such as Synergy creator Larry Fast, Germany's Klaus Schulze and Jon Appleton. The organization publishes its own monthly magazine/newsletter, SYNE, which contains interviews with artists, reviews of records and products, and a forum in which

members can offer advice and opinions, and generally "sound off." Plus, the organization's subsidiary, Ikon Music, offers for sale at special prices practically every electronic music album ever made—including some almost impossible to find elsewhere. Finally, members of IEMA receive a quarterly membership directory listing names and addresses of others who share an interest

in the field.

So why keep your synthesizer in the closet? Membership in the organization is free, and IEMA might make life a little more bearable as you try to explain to parents and friends just what all those wires and knobs really do. For more information, write the International Electronic Music Association, PO Box 456, Salamanca, NY 14779.

—Ken Walker

## SF LITERATURE

### 1980 NEBULAS

Arthur C. Clarke's best-selling "last" novel, *The Fountains of Paradise*, won the Nebula Award of the Science Fiction Writers of America for best novel of 1979 at ceremonies in Los Angeles on April 26th.

The Nebula Awards banquet was attended by close to 200 writers and their guests and capped two days of meetings and parties at the swank Beverly Wilshire Hotel. This was the fifteenth such annual gathering for SFWA (now officially known as SFWA, Incorporated, a non-profit group) whose membership of five hundred consists of writers, editors, agents and other professionals in the field of science fiction. Members recommend novels and stories for consideration during the year, at which time a jury selects titles from that list to appear on the final ballot. There are usually five finalists in each of the four categories. The other winners for 1979, besides Clarke: Best Short Story, "giAnts" by Edward Bryant, first published in *Analog Science Fiction*; Best Novelette, "Sandkings" by George R. R. Martin, from *Omni*; and Best Novella, "Enemy Mine" by Barry B. Longyear, from *Isaac Asimov's Science Fiction Magazine*. Bryant and Martin were on hand to accept their trophies in person, the common elements in the first two winners prompting Martin to joke, "This should be a hint to writers wanting to win Nebulas—write about giant bugs." Longyear's trophy was accepted for him by George Scithers, editor of *Asimov's*. Clarke's pre-taped message of acceptance was played for the audience by master of ceremonies David Gerrold.

The tone of this year's SFWA meeting, organized by novelist Diane Duane and chaired by out-going president Jack Williamson, alternated between gloom and celebration. The gloom centered on the current recession, which is beginning to affect book sales and profits. The celebration was inspired by the common feeling, expressed by Norman Spinrad, that "SF has made it to the big leagues" in terms of money and prestige for its writers. There was ample proof of that in the many discussions concerning the victory of writers Ben Bova and Harlan Ellison, both long associated with science fiction and fantasy, in their copyright infringement suit against ABC-Television and Paramount. That decision, ending a five-week trial, had been announced Friday, April 25th.

"Good News and Bad News" was definitely the theme of the Editor's Panel held Saturday afternoon, where representatives of book publishers—Susan Allison of Ace,

## AERONAUTICS

### TOKE ENCOUNTERS OF THE THIRD KIND



Cheech and Chong strike a reflective pose in the midst of complex laser lighting effects.

Science fiction film buffs are currently encountering alien denizens of the absurd kind thanks to the twisted mind of Grammy Award winners Cheech and Chong. Tommy Chong and Richard "Cheech" Martin have once again put their heads together and produced, not only a headache, but *Cheech and Chong's Next Movie*; the plot-plagued follow-up to their successful *Up In Smoke* cinematic opus of two years back. In this outing, the duo, who refer to themselves as "just your average Mexican-Chinese comedy team," get involved in dope-tinged dementia that takes them through a movie studio, a welfare office, a massage parlor, a police raid and, ultimately, out of this world. The film's climactic sequences feature Chong being taken on a breakneck joyride through the country by Cheech's rural cousin Red (also played by Cheech). From out of

nowhere a spaceship appears and whisks them aboard. The twosome are unperturbed by it all, however. It seems that the aliens on board are a group of ethereal space beauties who smoke dope in quantities rivaling the best years of the Haight-Ashbury breathe-ins.

The movie's way out sequences are the product of both Cheech and Chong's twisted comedic sense and the skills of some of the finest technicians in moviedom today. For the spaceship scene, Laser Media provided real life optical wizardry using a variety of laser techniques. In the past, Laser Media has contributed its expertise to the Electric Light Orchestra's rock tour shows, the laser-loaded *Star Wars* symphony concerts and the Broadway show *Peter Pan* (their contribution: a laser Tinkerbelle). This fall, their work will be seen in Ken Russell's *Altered States*

film.

*Next Movie's* production designer Fred Harpman is well known in science fiction circles, having created the look for the *Terminal Man* and *Beneath the Planet of the Apes*. He was also production illustrator on *Fantastic Voyage*, *Our Man Flint* and *In Like Flint*. Special effects master Joe Goss handled all the strangeness on *Next Movie*, a task which included having to send Cheech and Chong through the roof, literally, of their neighbor's house. Goss won an Emmy for his effects work on *Battlestar Galactica* and was also nominated for his effects on *The Six Million Dollar Man*.

*Cheech and Chong's Next Movie* was directed by Tommy Chong from an original screenplay he wrote with Cheech Martin....sometimes on the spot as the cameras rolled.

—Raoul Tweel

David Hartwell of Pocket and Victoria Schochet of Berkley—offered few encouraging words for writers, especially those without established reputations. "We're not in a position to buy the average book right now," Schochet said, echoing remarks of the other panelists. The news was somewhat brighter from the magazine editors—Stanley Schmidt of *Analog*, George Scithers of *Asimov's SF* and Robert Sheckley of *Omni*—who

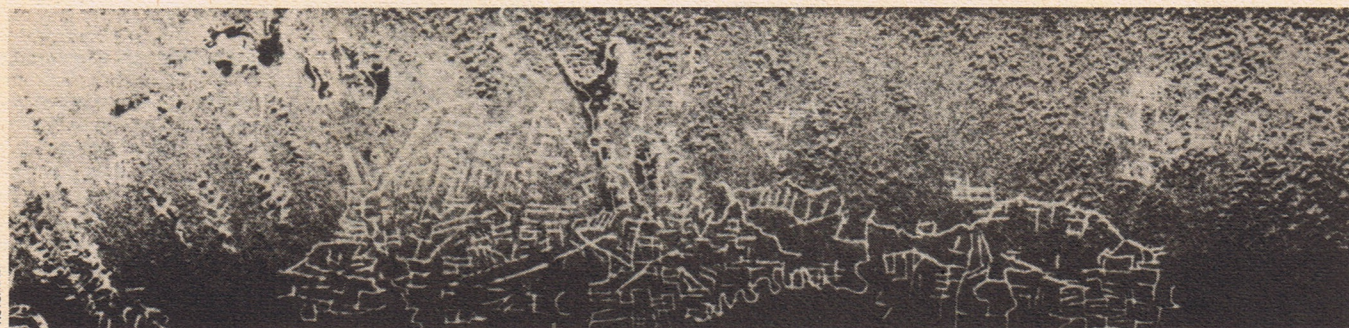
noted that they are actively looking for writers and stories.

During the SFWA business meeting results of a recent election were announced. The organization's officers for 1980/1981 are: President, Norman Spinrad; Vice-President, David Bischoff; Treasurer, Jack L. Chalker; and Secretary, Somtow Sucharitkul.

In attendance at the banquet itself were such authors as Robert Silver-

berg, Ray Bradbury, Gregory Benford, Poul Anderson, Larry Niven and Jerry Pournelle. Guest speaker Dr. Robert L. Forward, a scientist and recent SF author as well, joked that he was a "last-minute replacement for Robin Williams" and gave a presentation about travel to the stars. Dr. Edward Krupp, director of L.A.'s Griffith Observatory, spoke about "Science and the Media."

—Michael Cassutt



Anthropologists and archeologists have long wondered how the ancient Mayan empire grew enough food to survive in their marshy Central American homeland. Now they know. It was all done with canals, now hidden beneath the jungle growth. The grid pattern seen above was discovered in Synthetic Aperture Radar data from Guatemala's central

lowlands by Cambridge archeologist Richard E.W. Adams. He interpreted the pattern as a series of canals, and a subsequent ground expedition confirmed his idea. Synthetic Aperture Radar was developed by NASA and the military, and is now being used to map the cloud-obscured surface of Venus.

## COSMIC VIEWING

### GETTING DOWN

Name the most unlikely place to install a telescope. A) On a mountain, B) In your car, C) In FUTURE LIFE's editorial offices, D) Underground.

Unless you've been out of town lately, the obvious answer is D, underground. But that doesn't mean it may not be the best place to put one, especially if it's a telescope designed to detect cosmic rays. And that's exactly where one is being placed, 200 feet below the surface of the Earth in Grand Canyon Caverns, in northern Arizona.

The underground facility is part of a three-telescope network being established by physicists at the University of New Mexico under a grant by the National Science Foundation. The second unit is located 40 feet underground in the Sandia Mountains north of Albuquerque and the third is in an abandoned silver mine 100 feet below the surface near Socorro.

Why underground? The sources and directions of cosmic rays are still a mystery. They bombard the Earth from all directions of space, but not all of them have the same intensity. Trying to locate the more powerful sources means having to screen out the majority of the less energetic rays. Fortunately, these less energetic rays are absorbed in the atmosphere and UNM scientists are figuring on utilizing that fact by placing the telescopes underground so that the Earth itself acts like a huge "screen."

Commenting on the unusual approach, UNM astrophysicist Derek D. Swinson said, "Compared with the cost of sending up a satellite, this is a real cheap way of doing what we're doing. This equipment will allow us to sit on Earth and research the conditions of outer space."

The Cavern facility is pegged at \$60,000. —Philip L. Harrison

## NEVER MIND

### JUPITER EFFECT ?

Despite the predictions of a book called *The Jupiter Effect* (1974) by Dr. John Gribbin and Dr. Stephen Plagemann, we are *not* heading for solar disaster.

The authors point to 1982, when all the planets of the solar system will lie on one side of the sun—which happens once every 179 years.

They claim this will raise exceptionally strong tides and an overabundance of sunspots on the sun, leading to violent outbursts of solar storms that fire atomic particles into space. These atomic particles will affect movement of air masses in the atmosphere, slightly braking the rotation of the Earth, the speculation runs.

A sudden jolt like this, according to Gribbin and Plagemann, could release strains in our planet's crust, causing widespread earthquakes. They predict that one prime target is the San Andreas fault—that the forthcoming "Grand Alignment" may well trigger a California earthquake far worse than the San Francisco catastrophe of 1906. This time, however, it may hit Los Angeles.

The authors are not the Uri Gellers of astrophysics. Both have impressive degrees in their subject. Dr. Gribbin is physics consultant to the *New Scientist* magazine, a researcher at Sussex University in England, and a popular writer on science. Dr. Plagemann is a former NASA scientist, worked at the Institute of Theoretical Astronomy

under Sir Fred Hoyle, and is now at Dunsink Observatory in Ireland.

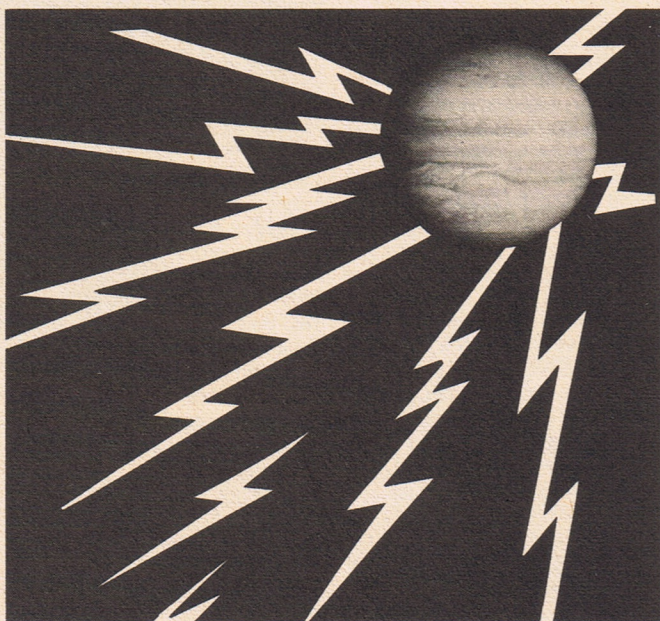
Yet their predictions have met little or no support from their scientific colleagues. Belgian astronomer Jean Meeus refuted their reasoning point by point in *Mercury* magazine (July-August 1979). English astronomer Patrick Moore recently lambasted London's Planetarium for its program called—predictably enough—"Omens," because it included a section based on Gribbin's and Plagemann's book.

Apparently Gribbin has modified his stand somewhat. In 1975 he wrote

that "there is *likely* to be a *slight* increase in seismic activity around the time of the next solar maximum." According to Meeus, even that statement is false since "there is no relation between the number of earthquakes and solar activity. One should not look at the sun to predict earthquakes."

If, unfortunately, there is a major earthquake in California in 1982, says Meeus, it will have nothing to do with planets or sunspots. But Gribbin and Plagemann will become famous because they "predicted" the event.

—Pat Glossop



## PEDALING JUNK

### PRIME TIME POWER

A California couple has found a perfect source of alternative energy for their home. Mr. and Mrs. James Holmes have hooked up a bicycle exercise machine to their

television set and whenever kids Mark, 8, and Elisabeth, 12, want to watch "junk TV," they have to pedal for the power to plug in the set. One hour's worth of pedaling produces just about one hour's worth of juice for the old tube. The strenuous exercise isn't constant, however. The kids can coast through educational shows, having to work up a sweat only for

that crass, commercial stuff. Although the Holmes household is, as yet, the only home in the nation to employ such a novel method of pay TV, a certain Pennsylvania publishing company is keeping an eye on its development, suspecting a national trend. Should one occur, make sure to check out *TV and Leg Cramp Guide* on your newsstand soon. —Ed Naha

## MUSE-ICK

### NO NUKES ON THE SCREEN

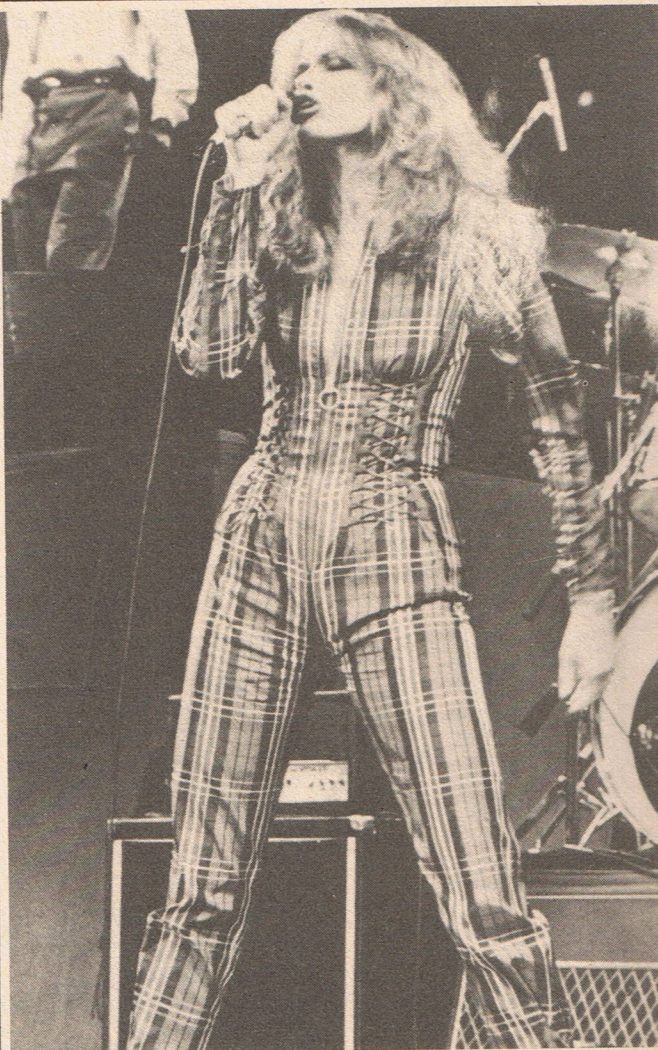
In the wake of the Three Mile Island accident in the spring of 1979, a group of popular recording artists concerned with the way nuclear power could affect the future of humanity held a series of concerts in Madison Square Garden. Dubbed the "No Nukes" concerts, the week-long September series was designed to financially benefit MUSE (Musicians United for Safe Energy), a non-profit organization formed to support non-nuclear research and activity groups. An elaborate soundtrack recording, *No Nukes*, was subsequently released by Elektra/Asylum Records and, this summer, a filmed version of the event, also dubbed *No Nukes*, will be released coast-to-coast. According to the film's producers, Julian Schlossberg and Danny Goldberg, *No Nukes* is not just another rock concert movie.

"The majority of the movie *does* consist of musical footage," admits Goldberg. "It's taken from the five shows at Madison Square Garden last year and features performers like Bruce Springsteen, Jackson Browne, James Taylor, Carly Simon, The Doobie Brothers, Bonnie Raitt and Jesse Colin Young.

"But," adds Schlossberg, "the political message is definitely a prominent aspect of the film. That's why these artists appeared in person in the first place and most of them state their exact feelings on the subject of nuclear power. We also have some candid comments filmed with the performers backstage. It's really an important topic for them. In essence, these musicians financed the film. They gave us access to behind-the-scenes operations the way no filmmakers have ever had before.

"They all worked for free, as did Danny and myself. In fact, no one working on the movie received anything but scale for their efforts and many of those people refused payment. All the proceeds from the film will go to MUSE. They, in turn, will distribute the money throughout the country to groups involved in non-nuclear futures." (Ed. note: Last fall, MUSE distributed a total of \$223,350 to over 210 anti-nuclear/pro-solar organizations.)

In addition to concert footage, the *No Nukes* cinematic show features a movie-within-a-movie concerning the dangers of nuclear power; a film especially created by the producers. "It's a kind of impressionistic movie," says Goldberg. "It's not a documentary along the lines of *60 Minutes*. It's a film that's designed to appeal to the people who come to see



Carly Simon puts forth an effective stance against nuclear power.

*No Nukes* for its musical content. Nobody is going to be turned off by it. Hopefully, they'll be educated by it. They will understand the essence of why these artists feel so strongly about the anti-nuclear movement."

"Hopefully," adds Schlossberg, "the sum effect of this movie will be twofold. We want it to be entertaining but we don't want it to be considered a concert film per se. We want to make people think. We don't expect everyone in the audience to rush from the theater and go on a picket line but we're hoping that we'll make people understand that there are a hell of a lot of sides to this issue. An issue that is becoming more and more complex and important in envisioning the existence and future of mankind."

"But it's not only a question of nuclear power," says Goldberg. "To me, the fact that people who have come out of rock and roll have decided to do something political is a very optimistic sign. During the 1960s, musicians were involved positively in political issues. There was a feeling of optimism. That was fol-

lowed by a period where the entire youth culture was jaded. The fact that musicians are caring once again and that a large segment of the youth population is involved as well is a very hopeful sign. There's an optimism to this film that transcends the nuclear issue alone."

Working in Zoetrope studios on the film's soundtrack with the same crew that so skillfully handled similar chores on *Apocalypse Now*, Schlossberg sums up the *No Nukes* experience thusly: "I think that a lot of young people are confused and scared about what's going on today in America. They're looking desperately for leader/figures to offer some kind of direction. Hopefully, the artists that are represented in the film offer young people a practical point of view, of direction. Their views are a little more realistic, a little more mature than those of the politically active musicians of the acid-tinged 1960s. These are human beings worried about the future of other human beings. That's the message we want to make clear."

—Ed Naha

## DOUBLE VISION

### 3-D SHOW EXTENDED

The Museum of Holography is extending the run of its current show "Similar Visions" through July and possibly September. Director Rosemary Jackson reports that the response to the show, which spans the development of three-dimensional imaging from the stereopticon of the early 19th century through today's most recent developments in holography, has far exceeded expectations. A planned eight-page catalogue of the exhibit has grown to an 80-page book on the subject.

Included in the exhibit is a variety of artwork created with many different 3-D systems. Visitors can see optical constructions, anaglyphs, vectographs, lenticulars, holographic stereograms, achromatic holograms, stereo paintings and a stereo slide show. A highlight of the exhibit is Murray Lerner's compelling *Sea Dream*, a 24-minute 3-D color movie in widescreen format. The film is shown at the museum every Saturday and Sunday at 2 and 3 pm. For further information contact the Museum of Holography, 11 Mercer Street, New York, NY 10013, telephone: (212) 925-0577. —David Hutchison

## LIGHT FLIGHT

### PLASTIC AIRPLANES

Look for plastics to begin taking over for metals in jetliners by the turn of the century. Dr. Carl S. Marvel, an internationally recognized expert on polymer chemistry (and at 85, one of the oldest working chemists in the world), has been working for the past six years to develop a plastic every bit as tough as aluminum.

"We have a very good polymer that will do the job," Marvel recently noted. His polymer can be made into sheets, will withstand high temperatures, won't corrode and, from a fuel conservation standpoint, weighs one half or less than aluminum.

The only problem left to solve, according to Marvel, is curing the plastic. The polymer is made into sheets by melting or dissolving it over a special fabric made out of glass or carbon. It has to be set by baking it at 570 degrees for three or four hours. Producing a large aircraft wing, for example, would require a very large oven.

But it's not an insurmountable problem.

The plastic/metal substitute could also provide a new material for car bodies, making them lighter and more fuel conserving. One researcher is looking into it as a coating for metal drills used to dig geothermal wells, especially since it could stand up to the high temperatures without corroding like metal. —Philip L. Harrison

## COSMIC CODGERS

### FUN IN FREE FALL

While most space freaks are anxiously awaiting their chance to sample zero gravity, NASA scientists are still trying to figure out just what effects prolonged weightlessness has on the human system. Such problems as the loss of calcium experienced by Soviet cosmonauts could severely limit long-duration flights unless they are solved.

Another difficulty experienced by at least half the astronauts who have been up in space is space sickness, a form of motion sickness. While not exactly fatal, it can prove extremely uncomfortable (not to mention embarrassing) in deep space.

Dr. Patricia Cowings, a psychophysiological at NASA's Ames Research Center, has developed what

may be a cure for space sickness. By using a form of biofeedback coupled with mental exercises, 85 percent of the subjects in a NASA test were able to suppress their symptoms of motion sickness when seated in a quickly spinning chair. The experiments have proved so successful, in fact, that Dr. Cowings' study has been tentatively chosen as one of the few to be tested on either of the first two flights of the space shuttle. Trained crew members would be monitored during the flight for any signs of the illness. They would then apply Dr. Cowings' treatment and report on the results.

Interestingly enough, while Dr. Cowings found no significant sex differences in susceptibility to motion sickness, she did find that the older the subject, the less likely they were to suffer from it. Yet another boost for older astronauts has come from

NASA/Ames recently, in the form of testing to see if humans older than 55 could withstand the physiological stress of weightlessness. A group of males aged 55 to 65 were subjected to prolonged bedrest, the usual NASA method of simulating weightlessness, and various tests afterwards. Preliminary findings indicate that healthy men up to the age of 65 should have no problems going up in the shuttle; and in fact, their reactions apparently showed very little differences to those of younger groups of men and women tested earlier. Women aged 55 to 65 will be given the same examinations in January, '81.

So, fear not! No matter how long it takes the shuttle to get off the ground, there is reason to believe that most of us will still be eligible for the first passenger flights into orbit.

—Barbara Krasnoff

## IN SEARCH OF

### CHINESE BIGFOOT

Apparently the Chinese are taking Western culture more seriously these days. In fact, they are now taking up one of the more popular American pastimes: searching for the abominable snowman.

Some 33 sightings have recently been made of a strange, seven-foot-tall, shaggy creature roaming the Shennongjia Forest in Hubei province. This description was deduced through the examination of various footprints and remnants of body hair gathered by researchers; but there is also a firsthand report by a local herdsman, who in 1979 asserted that he had been captured by what he called a "wildman" which let him go only after he used his knife.

An expedition is being launched by the Chinese Academy of Science, along with other institutions, to try to find the creature. Being a humanitarian concern, the group is fully equipped with hypodermic needles in order to subdue the "snowman" and bring it back to civilization ala King Kong. This, of course, assuming it lets them get near enough.

—Barbara Krasnoff

## COMPUTER ERRORS

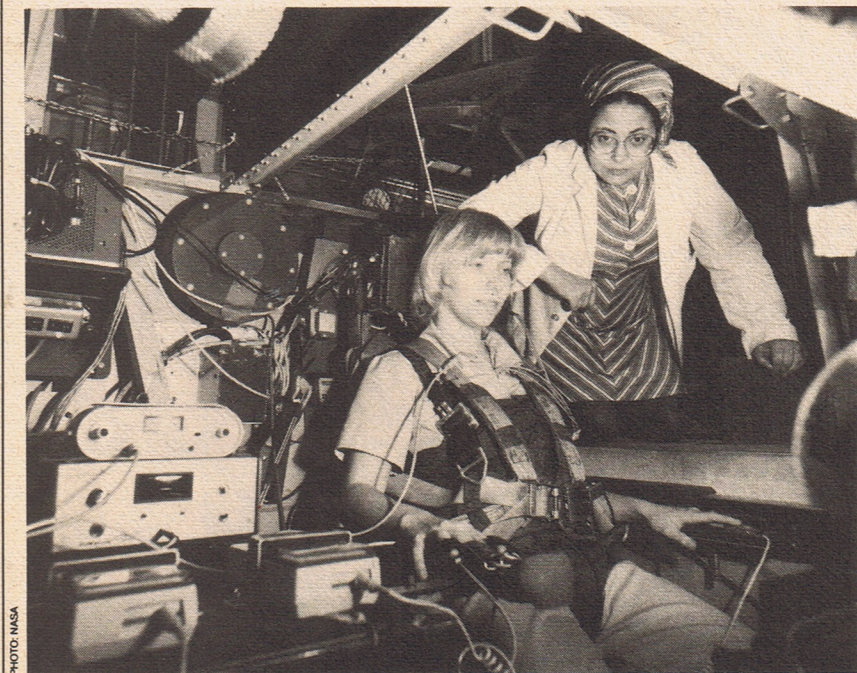
### VOTRAX KNOWS

Computers may finally be on the verge of getting even with humans who insist on labeling problems "computer errors." Votrax, the newest "employee" at the Fermi National Accelerator Laboratory in Batavia, IL, is a talking computer designed to guarantee that its human operators don't mistake one blinking light for another. It's literally the talk of the control room, where one human employee propped a Mexican warrior mask in front of its voice synthesizer.

According to human Jeffrey Gannon, operations group leader at the atomic particle accelerator, "Many times, if the operator is tuning, he may make an alarm go off. If you think you're the cause of the problem, you will tend to just reset it. It's human nature. But if it was some other problem, you may not have looked up at the panel to see what caused the alarm to go off. This computer tells you without looking."

To listen to it from Votrax's point of view, in a voice not unlike that of the Cylons from *Battlestar Galactica*, its prime function in life is to "inform control room personnel of the reason or reasons that the main ring beam is aborted."

If only life were that simple for the rest of us. —Philip L. Harrison



Lab assistant Leah Schafer is strapped into a vertical acceleration device by Dr. Patricia Cowings at the Ames Research Center. Dr. Cowings has developed a method of preventing motion sickness through biofeedback which may also be used effectively by astronauts suffering from space sickness.

PHOTO: NASA

## COSMIC COMMERCE

### AMERICA NEEDS SPACE

"America Needs Space To Grow" read a popular bumper sticker a few years ago, and now the investigative arm of Congress says it's so.

The General Accounting Office (GAO) recently warned Congress that America may lose its lead in space technology if it doesn't invest more money in the space program. In a report released early this year, the highly respected GAO said what science fiction writer Robert A. Heinlein has noted for years: the uses of space are so potentially lucrative that humanity will certainly colonize the final frontier. But unless America

invests more heavily now, the faces of spacemen are likely to be Russian, Japanese or German.

The GAO report pointed out that several European countries are pouring massive funding into research on space manufacturing. It said many scientists believe orbiting factories will be common by the end of the century. Citing the possibility of making perfect crystals, pure vaccines, better electronic components and many other alloys, chemicals and medicines in the weightless vacuum of space, the report said the government must start working with private industry now to exploit this potential.

"Failure... could lead to loss of U.S. preeminence in space, both technologically and economically," the report warned. It said both govern-

ment and industry must take financial risks to be sure that doesn't happen.

Since it is too early to make specific predictions as to what can be manufactured economically in space, the report said, "the program receives little visibility or support in Congress or by the Administration and low funding by NASA."

The GAO recommended that the government should double or triple the \$20 million NASA budget just to stay even with Russia, Japan, West Germany, France and other nations.

"If preliminary assessments by many scientists are correct," the report said, "the eventual economic and social impact from new scientific discovery could be enormous... creating a virtual knowledge explosion." —Allan Maurer

# SKYLAB

## AN OBITUARY ROMANCE

By DAVID HOUSTON

**J**uly 12, 1979. One year ago. In the black distance just above the curved blue horizon of Earth, Skylab looks like an aircraft, a bulbous helicopter with its engines still and its wing and fuselage lights flashing.

Closer. Its skin is blistered, streaked and discolored by the sun; and the lights are on solar panels, not rotors. A command and service module assembly hovers near its cylindrical side; the assembly is insubstantial: stars are visible through it. And in the vacuum of space, there is a voice.

"... Solar wing two is completely gone off the bird. Solar wing one is partially deployed." The voice is Pete Conrad's—commander of the first Skylab mission.

The module hatch opens and pilot Paul Weitz floats upward, outward, his legs gripped by science-pilot Joe Kerwin whose own legs are clamped onto the couch inside the module. These three astronauts must repair their space ship to make it habitable. From stresses when the ship emerged from the long egg that carried it up through Earth's atmosphere, one solar panel is lost; its counterpart is intact but held down by a strap from the mangled meteorite shield.

"We're all trying to break it loose," says Weitz. "It's only a half-inch strip; but man, is it riveted on!"

Our first space station is makeshift, full of

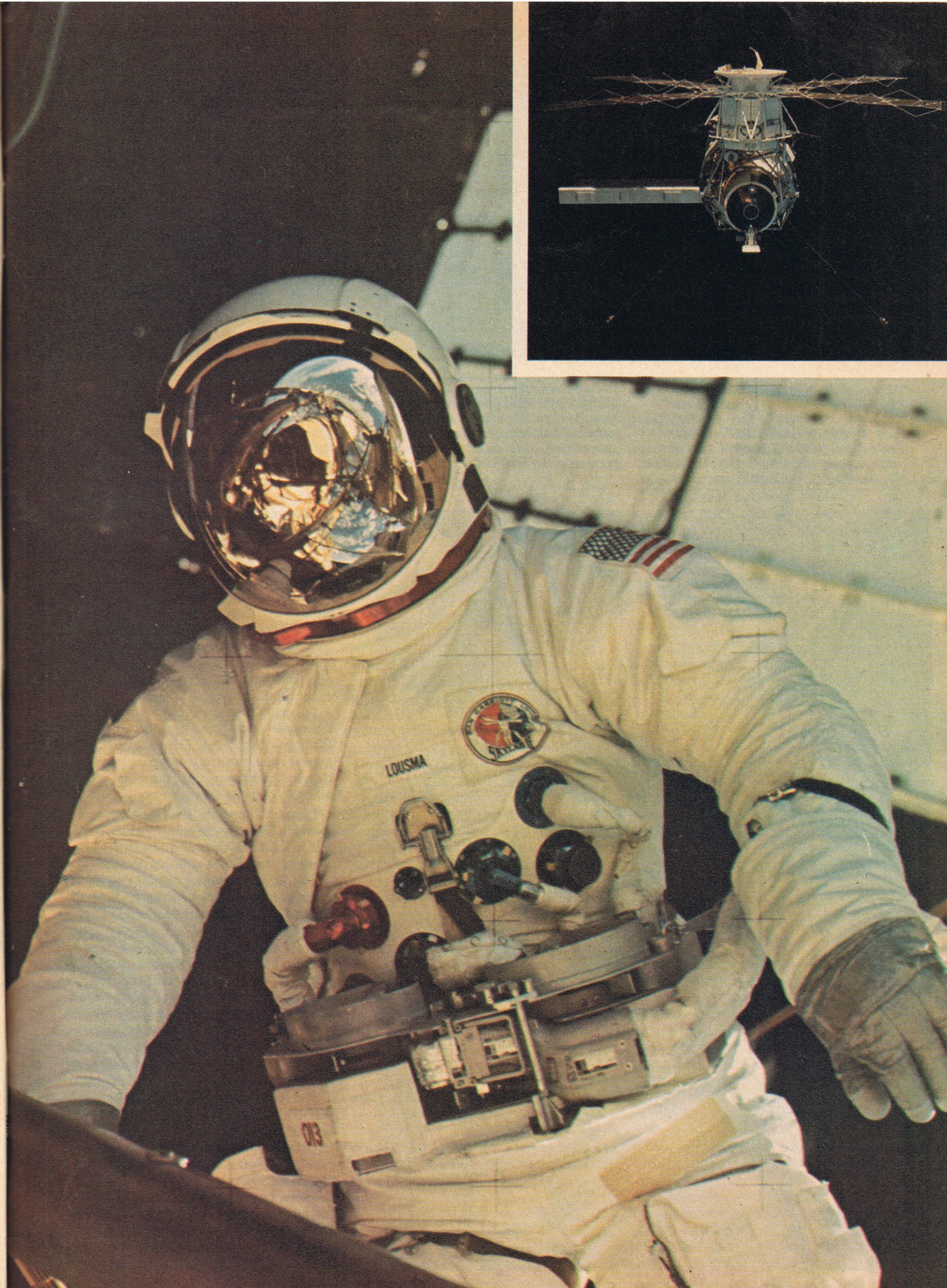
glitches and bugs. The transportation ships are old Apollo modules that were meant for, but never made it to, the Moon. Many of the fixtures, instruments and systems are off warehouse shelves. And the workshop and living quarters are in what was once an empty Saturn IVB fuel tank.

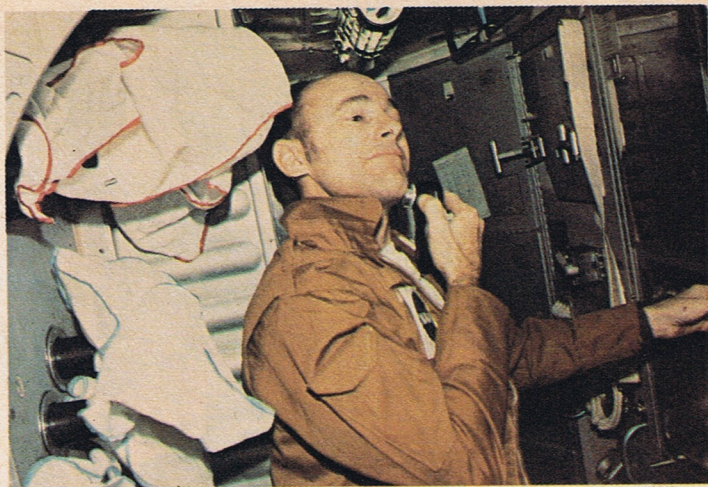
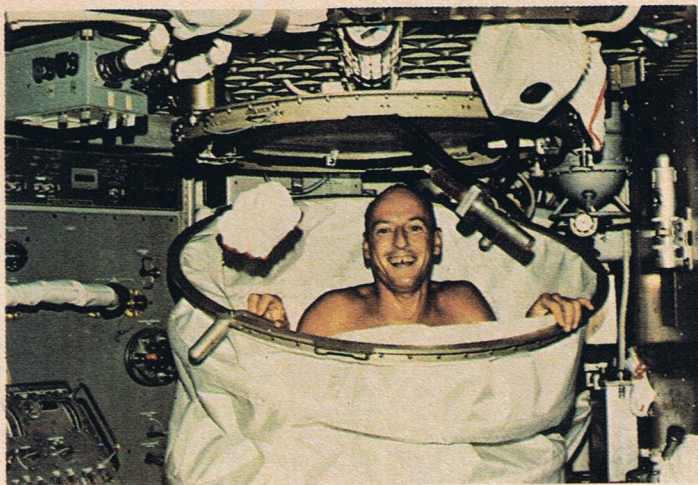
The module assembly dissolves into a star cluster, but still there is a shadowy white shape outside Skylab—a man. He "stands" at the outer extreme of the solar telescope. He is Jack Lousma, pilot of the second mission—out there to change a film pack at the base of the telescope; and he is saying to his teammates inside Skylab and back on Earth: "To be on the sun end of the telescope mount, hanging by your feet as you plunge into darkness, when you can't see your hands in front of your face—you see nothing but flashing thunderstorms and stars—that's one of the minutes I'd like to capture and remember forever." Lousma, and Skylab, are traveling at four miles per second, circling the globe in a mere 93 minutes.

Lousma dissolves into Ed Gibson, science pilot of the third mission, who is performing a similar chore and reporting:

"Boy, if this isn't the great outdoors! When you're inside looking out the window, the Earth's impressive, but it's like being inside a train; you can't get your head around the flat pane of glass. But if you stand out-

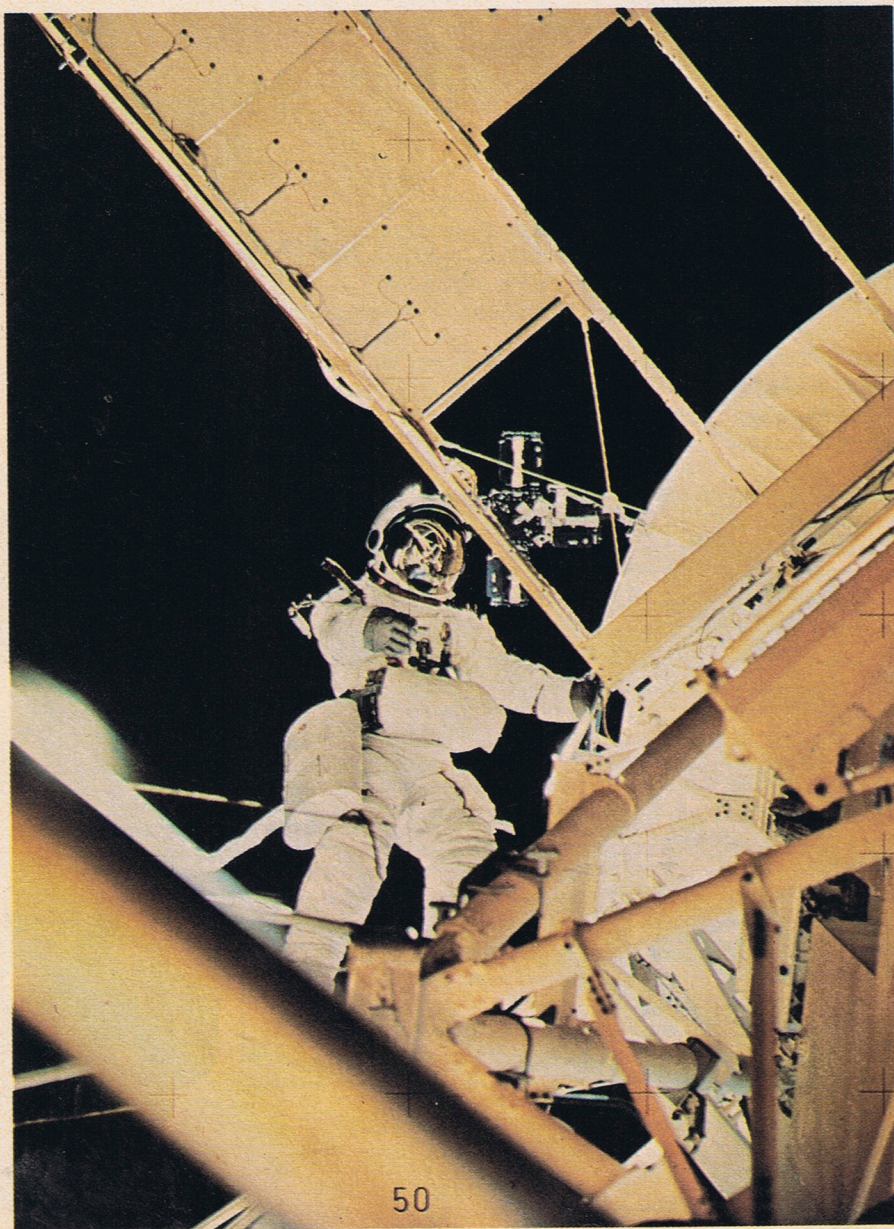
Right: Skylab 3 astronaut Jack Lousma and (inset) the last photo of Skylab in orbit.





Above, left to right: Skylab astronauts at home—Charles Conrad grins after a hot “bath” in the zero-gravity shower facility; Alan Bean attempts to shave in the midst of a floating apparel storm; Joseph Kerwin performs a dental checkup on his acrobatic commander Charles Conrad; Alan Bean runs a test on

NASA's backpack maneuvering system in full pressure suit regalia, and Gerald Carr tests the same device in more casual shorts and sneakers. Below: Owen Garriot, Skylab 3 science pilot, conducts some extravehicular business at the Apollo telescope mount.



doors, on the workshop, it's like being on the front end of a locomotive as it's going down the track! But there's no noise, no vibration; everything's silent and motionless; there are no vibrations going through your feet, no wires moving, nothing flapping. You know what's neat? As I look here, I can see the horizon move; a little blue line is dropping as we drop behind the Earth. It makes it seem like a planet instead of just a picture, like you're really going around something. God! I'm glad that Saturn rocket worked!”

Inside, in the aft compartment just over the airless waste disposal tank, three ghosts take shape. They're dressed in the monotonous light brown shirts and trousers of NASA issue. They are commander Gerald Carr, pilot Bill Pogue, and science pilot Ed Gibson, of the third mission.

Pogue: “Okay, come quick—you can see the whole Texas coast from Brownsville to Houston, Beaumont, Port Arthur!” He moves around until he is upside down relative to the perceived verticals of the room, and the others join him at the round porthole.

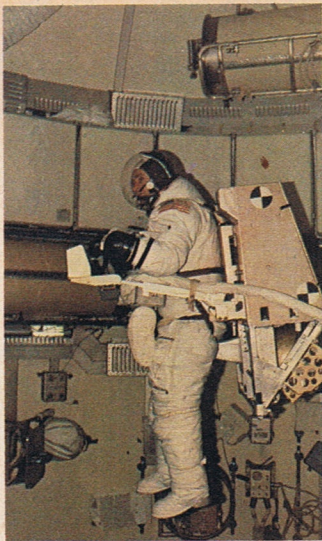
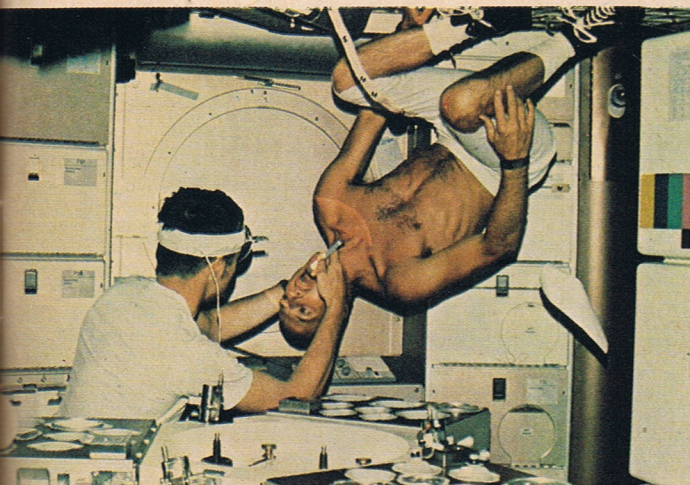
Pogue: “The whole Gulf Coast looks clear as a bell. We have the whole Florida peninsula in sight. All the way down to the Keys. Miami's lit up. Look at Miami Beach!”

Carr: “Holy cow, look at that! You can see the interstate highway all the way down the center of Florida, right down the middle of it like a backbone...”

From the more than 40,000 photographs of Earth taken, many of them from this very window, astronauts and geologists discovered a vast new copper deposit, learned that major earthquake faults did not fall where they were thought to, traced marine migrations, studied agricultural progress, predicted the paths of hurricanes, found oil deposits, and tracked glaciers and icebergs.

The three ghosts fade away. There's only the hum of ventilators, and a whir from a little fan Conrad jury-rigged to keep exercisers from suffocating in their own heat, odor and carbon dioxide: without gravity, there are no convection currents.

There, by the window, in an elastic strap against the wall, a Ray Bradbury paperback. Perhaps it's Gibson's. One of his favorite science fiction stories is about astronauts from another world who survey Earth from



space.

Bang—thud—bang—thud—bang—it's Conrad and his first-mission crew running around the inside of the cylindrical workshop to create a semblance of gravity. Contrary to the usual reports, weightlessness is not always fun—not even always tolerable.

"I've just lost some medicine." Pogue's voice comes from nowhere. "It just drifts away, and you never see it again!"

Nothing will stay put on the workbench. "I think the firing squad is in order for the people who designed that little gem," Gibson complains.

Why doesn't the space station rotate, creating artificial gravity, as any good space station should—like those in *Conquest of Space* and *2001: A Space Odyssey*? Too expensive, says NASA, and besides, a study of human beings in the weightless environment is what Skylab is all about.

Weightlessness, it has been learned, can cause bone calcium and red blood cell loss, muscle deterioration (the only muscles that come back to Earth stronger are of the stomach, since there is no gravity assist for any kind of bending), conjunctivitis, even sinus trouble.

Weightlessness—a dangerous unknown that nine volunteers subjected themselves to for 28 days (the first mission), 59 days (the second mission) and 84 days (the third mission) while traveling in orbit a total of 70,500,000 miles—about twice the normally quoted distance to Mars.

Back again on Earth, Pogue says, "In the shape I was in when I landed, I could not have walked out onto the surface of, say, Mars, and done good work."

A flashlight tumbles aimlessly through the space of the forward living compartment. It belongs to Alan Bean, Commander of the second mission; it has floated unnoticed out of his pocket. It barely misses a magnetic playing card that seemed frozen in mid-air until the passing light stirred it; then it goes on to bounce slowly off the lead-lined film vault that is still loaded with raw film, waiting for the next mission that will never come.

The air need not move anymore. Scraps of paper, tools, a hypodermic needle, a wash cloth, an elastic strap and other small items that once stuck to the vent filter now float

freely in the space of the abandoned Saturn IVB fuel tank.

An alarm sounds: a solar flare has begun. Though it's the middle of the sleep period, someone responds. Soon classical music emanates from the cassette deck up on the solar observatory in the docking adaptor. Classical music—that means it has to be Gibson or Kerwin at the console. With Bean, it would have been country music.

"The solar console," says Bean, "is the only time you really have by yourself. You come up here and spend two or three hours and it's really pleasant work."

That pleasant work resulted in the accumulation of more knowledge about the sun than has been accumulated in all the previous history of astronomy—during Skylab's 2,476 manned revolutions and from its 182,842 solar photographs taken in various wavelengths and conditions.

Wrapped around the cramped solar observatory are the oxygen and nitrogen bottles for cabin air—still containing five month's worth—one of which will, a few hours from now, be dug out of its crater in the Australian Outback.

It is hot inside now; there is a new vibration and the hint of a scream not made by man or machine. Skylab is falling.

There will be no rescue mission. Although NASA spent around \$20 million developing an engine that could be linked to Skylab to push it to a higher, safe orbit, there is no space shuttle ready to deliver it. Nor can Skylab be blown to bits before its frightening re-entry: a missile's blast would only scatter the debris unpredictably.

Commander Carr is back on Earth, in Houston. As Skylab shudders and heats, he is saying:

"I don't think the Carter Administration has provided adequate leadership and support for the space program. I think it's rather stupefying to think that HEW spends NASA's annual budget about every seven-and-a-half to eight days. That just blows my mind. Most of what's spent by HEW does nothing for the gross national product, but the space program has, over the years, usually generated something on the order of four or five times its expenditures in the gross national product."

The debris floating in Skylab follows ghostly orders: it all turns in unison as the nitrogen thrusters on the space station—triggered by a command from the ground—turn the craft sideways in its orbit. An almost invisible film floating in the debris is what's left of a weightless web spun by Arabella, the astro-spider. A faint image of Owen Garriott, science pilot of the second mission, who had never been in space before, sees Arabella's web and comments softly, "It seems she learned very rapidly in zero-g without benefit of any previous experience."

"What if," someone asks in Washington, D.C., "a chunk of Skylab falls on Washington while President Carter is commemorating the 10th anniversary of the lunar landing?"

"Don't even think it!" pleads a White House aide.

A yank, a jerk, a rumble, the creaking of metal, as Skylab begins to wobble and roll. Conrad's voice comes from his ghostly form, turning exuberant somersaults with the floating debris: "Mobility around here is super! Nobody has any motion sickness. Every kid in the United States would have a blast up here!"

As paint flecks off Skylab's skin, and slivers of hot foil tear away from the heat shields, their bright flashes stream through the window. Pogue remembers the sensations of a violent solar flare that sent electrons impacting blindingly on the astronauts' eyes. "Mark! Both eyes! Mark Mark! Streaks going in different directions. Mark! Golly, they're really zapping me! Mark! Mark! Mark! Mark! Mark! I'm getting zapped by the tadpoles. Oh man, I don't know what happened. All heck broke loose!"

Inside the space station, outside it departing in an Apollo module, and already on the ground, Gibson says, "It's been a good home. I hate to think we're the last guys to use it."

Conrad looks back at Skylab. "I never got tired of looking out the window. I never got tired of zero gravity."

A missile, a comet, a meteor, a shower of lights. Skylab drops down into the sunset over the Indian Ocean, streaking in pieces toward Australia.

July 12, 1979.



# HUMAN INTELLIGENCE INCREASE:

The Last  
4,000  
Years

AND

The  
Next  
40 Years

By ROBERT ANTON WILSON

**W**e can expect more changes in human life during the next 40 years than occurred in the previous 4,000 years.

This is a perfectly safe, non-Utopian prediction because of a little-understood factor in human life which I call the  $I^2$  function.  $I^2$  stands for several things simultaneously—Intelligence Intensification and Information Increase, for instance.  $I^2$  can also mean  $ego^2$ —that is, the mutation and dilation of our self-images as we are continually transformed by the techno-social forces that have been mutating us for the past several millennia.

Before discussing the accelerated metamorphoses of the next 40 years, let us review briefly how the  $I^2$  function has been progressively discovered.

Just before the American and French revolutions of 1776 and 1788, several philosophers began to propose that there was no limit to "progress"—that there was nothing in human life that couldn't be changed and improved indefinitely. Condorcet, the mathematician, expressed this idea most pointedly of all, daring to speak of "*the infinite perfectibility of mankind*." Such ideas played a large role in unleashing both of the revolutions mentioned, and the Mexican revolution of 1810, and a great deal of subsequent radicalism.

Of course, Condorcet and the other 18th

century radicals were a bit *too* optimistic; they all tended to think that there would be no hindrance to perpetual progress once monarchy had been replaced by democracy and the Pope had been prevented from interfering with scientific enquiry. Things were not quite that simple, and most of the Utopian thought of the 19th century—including that of Karl Marx, whose passionate desire for justice combined with his intolerant authoritarianism unleashed the Communist movement—was based on attempts to produce "Instant Progress" by giving the State the power to, as it were, *force* everybody to be happy. This hasn't worked very well.

In the 1890s, however, two brothers who happened to be the grandsons of one American president and the great-grandsons of another, namely Brooks and Henry Adams, began to see the laws of social change a bit more clearly. They proposed what Henry called *the Law of Acceleration*. This alleged law, which is not quite accurate, claims that change is not caused by politics or revolutions, which are only symptoms; change, the Adamses said, is caused by economic-technological factors within society itself. And, guessing wildly, Henry Adams proposed that change occurs at a rate which is the inverse square of time.

Specifically, Henry assumed a 90,000-year interval from the dawn of Homo Erectus (anthropology was just beginning then) to the Scientific Revolution of Galileo, Bacon, etc. circa 1600. He assumed further that the next jump had been completed circa 1900, with

quantum theory, the discovery of radium, the Wright Brothers, etc. Now, 300 is the square root of 90,000, so Henry Adams assumed the next jump would be completed in  $\sqrt{300}$  years—that is, in roughly 22½ years, or around June 1922.

Things are not (or were not) moving quite that fast.

But, while Henry was indulging in wild mathematics, brother Brooks had hit on something even more interesting. He noted that the accumulation of capital—that is, the center of economic power in the world—had been moving steadily westward for several thousand years. It had moved, he noted, from Babylon to Greece, from Greece to Rome and thence to Renaissance Italian city-states, upward but still westward to Germany and then England, and was hovering when he wrote between London and New York. He predicted that it would shift to New York, which has indeed happened.

(Is it about to rebound eastward suddenly, due to the emerging Arab oil-states? We will see reasons to doubt that as we proceed.)

In 1918, a military engineer, Major C. H. Douglas, who evidently had not read Brooks and Henry Adams but sounds as if he had, carried their kind of thinking a step further. The major factor in social change, Douglas said, was the *increment of association*, which creates a *cultural heritage*.

The increment of association simply means that when you've got more people organized together, you can accomplish more work;

R. Buckminster Fuller defined the  $I^2$  function as *synergy*—the kind of reaction where  $1 + 1$  does not equal 2, but  $2 +$ . For instance, put a man and a woman in bed and you might get, in nine months, three people, not two. Fuller realized that the highest form of synergy was mind itself, which is, as he says, inherently self-augmenting.

something Adam Smith had already noticed in 1776. But Douglas saw this more dynamically than Smith had. The increment of association increases from generation to generation, he noted, because of cultural heritage—the passing-on of knowledge, gimmicks, devices, tools, ideas, etc.

Obviously, a tribal society could not build the Parthenon, even if an architect of genius were born among them. The increment of association and the cultural heritage were not there. Similarly, a Renaissance city-state, even with Leonardo da Vinci in charge, could not put Neil Armstrong on the Moon. From trajectories like these, Douglas calculated that the movement of capital, noted by Brooks Adams, followed the movement of ideas—of both *hard* and *soft* technology. And, since our stockpile of ideas is increasing from generation to generation, change is indeed accelerating, although not quite according to Henry Adams' inverse square "law."

Douglas also noted that capital itself was increasing—a radical idea at the time, and disputed by both socialists and Free Market economists. We now know that Douglas was right, and economists of all schools agree that capital is increasing at around two percent per year (which means that world capital doubles about every 25 years.)

A few years after Douglas, in 1921, Count Alfred Korzybski, another engineer, defined the  $I^2$  function in his own way, calling it *time-binding*. Time-binding is the mechanism of the cultural heritage, Korzybski says, and it is based on our capacity to generate more and

more inclusive kinds of symbolism. As we advanced, he says, we moved from grunts and howls, like other primates, to articulate human speech, to written language, to math and graphs and calendars, to scientific laws; and now to computer simulations and electronic world-wide information systems. At each step, we learn more about how to model the universe, and how to predict what will work and what will fail.

The time-binding function, Korzybski calculated, operated roughly like a geometrical progression:

2 4 8 16 32 64

This seems to be a much closer approximation of the truth than Henry Adams's inverse-square guesstimate. Dr. O. R. Bontrager has collected scores of graphs of the rate of change in various fields of technology, and they all approximate to the graph of Korzybski's simple geometrical progression.

Although this is not as shocking, at first sight, as Adams' guess, it is equally startling when you look at it for a while. For instance, continuing the 2-4-8 series five more steps beyond the sixth term, 64, where we left off, we find ourselves suddenly at 2048; and going five steps further, at 63,536. . .

We now know that some things are moving even faster. For instance, J. R. Platt of Michigan State University has calculated that speed of travel increased 1,000-fold since 1900 and speed of communication 10,000,000-fold. One man flew the Atlantic in 1928, but 200,000,000 men, women and children flew the Atlantic in 1978, 50 years later.

In 1928, when that lone man, Charles Lindberg, was flying the Atlantic in his crude bi-plane, engineer-designer R. Buckminster Fuller, who had read Korzybski, defined the  $I^2$  function as *synergy*. Synergy is the kind of reaction where  $1 + 1$  does not equal 2, but  $2 +$ . For instance, put a man and a woman in bed and you might get, in nine months, three people, not two. Add molybdenum to steel and you get an alloy tougher than either or both. Bring Arabian mathematics to Europe, mix it with the empirical knowledge of the craftsmen, and you get Galileo and the science of physics.

Fuller realized that the highest form of synergy was mind itself, which is, as he says, inherently self-augmenting. That is, you can't put two ideas together without a third idea emerging, almost as in our sexual example above. Fuller agrees with Douglas: capital increases, because ideas are always increasing. The world is moving toward larger and larger coherently organized systems, each capable of doing more, synergetically, than earlier, less organized systems.

In 1944, Nobel physicist Erwin Schrödinger added the next block to the definition of  $I^2$  in a book called *What Is Life?* Schrödinger noted that everything in the universe, *except life*, follows the Second Law of Thermodynamics in moving steadily toward maximum entropy (which for our purposes we can define loosely as chaos or incoherence.) Life, however, moves in the opposite direction: toward higher organization, greater coherence, *negative entropy*.

In the next few years, almost simultaneously, Claud Shannon of Bell Laboratories and Norbert Wiener of M.I.T. realized that the information in a message could be mathematically expressed as negative entropy. The whole science of cybernetics comes out of this discovery, but that is not our topic here. What is interesting to us, in terms of  $I^2$ , is that the momentum of life toward greater coherence is, as Shannon and Wiener noted, vastly accelerated as life's techniques of information-processing improve. In short, the movement from grunts to language, to math, to computers, is a movement toward Information Intensification and against entropy, a movement toward coherent order and against random decay.

As Bucky Fuller was quick to point out, the development of Information Theory by Shannon and Wiener enables us to see the human mind as the greatest synergy-machine, the greatest tool for doing-more-with-less, in this part of the universe.

Fuller points out that knowledge can only increase (except for tragedies like brain damage in an individual or totalitarianism in a society). As our communication skills and information processing improve, human knowledge as a whole accelerates synergetically. Therefore, both hard and soft technology accelerate—ideas and tools both change faster, faster, faster. And capital accumulates accordingly.

The ever-provocative Dr. Timothy Leary gives us a final set of models to understand the law of acceleration. In *The Intelligence Agents*, 1979, Leary claims the east-to-west movement, seen as a migration of capital by Brooks Adams, is really a movement of genes. The Earth turns west-to-east; the harder, more innovative genes, he claims, go against this and move east-to-west. The shift of power from Babylon to New York noted by Brook Adams is still continuing, Leary avers; the pioneer genes are piling up on the West Coast, *and getting ready to blast off for space*.

This oddly parallels the theory of sociologist Carl Oglesby that there is a cowboy-versus-yankee war in our ruling class. The cowboys are still looking for a new frontier, Oglesby says; the Yankees have turned conservative. Control of our economy is split between the old New York capitalists and the innovative Western cowboy-capitalists. The latter group, of course, are the ones who are heavily investing in the space industry.

There is clear relevance between all these notions, and they all contribute to our understanding of socio-economic change. The Adamases on migration and acceleration, Douglas on increment-of-association, Korzybski on "time-binding," Fuller on synergy, Schrödinger on life as an anti-entropic process, Shannon and Wiener on information as negative-entropy, and Leary on neuro-genetics, all illustrate part of what we mean by Information Increase. That Intelligence Intensification (a term borrowed from Leary) is part of the worldround 4,000-year information explosion should also be clear. Our hunting-gathering ancestors did not need the vari-

ety of *kinds* and *styles* of intelligence that the Greeks of Plato's age needed. More intelligence, of different flavors and functions, were necessary for the transformations known to us as the Renaissance, the Industrial Revolution, the rise of representational government. New types of intelligence are being produced to cope with the computer revolution and the burst into space.

The other aspect of I<sup>2</sup>—the continuous mutation of the ego—is more subtle. Tribal people only know themselves and define themselves as units within the tribe, just as they only know the universe as a few miles, or a few hundred miles, with a sky over it. Urbanization and civilization created a domesticated human ego, more self-direction, and a quality of alienation or *anomie* resultant from the loss of the tribal bond (extended family). The Renaissance created the modern individual, questing, impatient, monstrously "selfish" by the standards of traditional societies, seeking personal and impersonal goals unthinkable earlier in evolution. In this century, and especially since 1945, a new ego, a new social self-definition, is emerging, amid the usual chaos and anxiety that attend any major transformation.

We are less like our grandparents than they were like the first food-gathering hominids. Every time you turn on the TV, you participate in a miracle that is transforming you more than you know. It doesn't matter what's on the tube; as McLuhan said, *the medium is the message*—to a great extent anyway. The very fact that the tube can bring you live pictures from the other side of the planet causes you to know yourself in a different way than any previous generation. You intuitively have a different sense of who you are, where you are, what you are and why you are.

This neurological shockwave, which has been rising and accelerating for 4,000 years, is not going to stop or decelerate in the next 40.

Life will continue to be I-opening in every sense.

The computer revolution will mutate us far more than TV, and much faster. Here's an example of time-scale: when I entered high school, in 1946, there were virtually no TVs in private homes in the U.S.; by the time I finished high school in 1950 almost everybody had a TV. All the signs are that home computers are going to sweep the country in the next four years the way TV did in my high school days.

The computer is a seductive beast. Everybody—even people who think they hate technology—gets hooked after a few hours of sitting at the console and playing around with this marvelous toy. Children seem to turn on to it even faster, and jump quicker from simple to sophisticated programming. Thus, the proliferation of home computers in the 1980s is going to be a tremendous quantum jump in all dimensions of I<sup>2</sup>—intelligence intensification, information increase and a new sense of who and what we are.

You can't play with computers for long without beginning to sense that *intelligence is the capacity to receive, integrate and transmit*

*signals*. You begin to see your own nervous system as a marvelous computer in itself, and you want to expand and accelerate its workings. You want it to *receive* more signals, *integrate* them into better simulations or models of the world, *transmit* them more efficiently. Intelligence Increase begins to seem as hedonic as the quest for consciousness expansion in the '60s.

You begin to understand McLuhan's paradoxical claim that the medium is the message. The ideas in this article—especially the Schrödinger-Fuller concept of evolution as a struggle for better information and less entropy—begin to make sense intuitively and sensorily. Your nervous system is expanding by interfacing with the computer, which in turn will more and more be interfacing with other computers on Earth and in space.

Meanwhile, of course, none of our present "problems" are going to go away overnight. Third World liberation, Black liberation, Women's liberation, etc. will continue to demand attention and solution. Terrorism will be with us for a while yet—as long as there are people in the world who think that a small group of white males in the Western world have too much power and use and abuse that power without empathy for the needs and aspirations of others.

There is no need to build doomsday scenarios about this worldwide struggle to decentralize wealth and power. The first axiom of the I<sup>1</sup> hypothesis is that if a problem exists, a solution must also exist. The evolutionary function of problems is not to lead us to throw up our hands and cry out that the species is doomed, but to provoke us to think of solutions.

Sometime in the next 15 years, between 1980 and 1995, the first longevity pills will be appearing. This is only a guess, of course—the time factor cannot be estimated, really—but there are more scientists working on life extension today than there were working on atomic energy in the 1930s, before Einstein wrote his famous letter to President Roosevelt about German research in nuclear weaponry. As soon as any country gets a strong hint that some other country might have an anti-aging formula, or might be close, such research will spurt ahead dramatically.

(Some of the longevity pills currently used by faddists—especially Vitamin E, megadoses of Vitamin C, and RNA—may already be some slight help in extending lifespan, although the evidence is not conclusive yet.)

Several researchers have already reported extension of lifespan in experimental animals.

There have been several articles on this subject in popular magazines lately, and a rash of books such as *Prolongevity* (Rosenfeld), *The Life Extension Revolution* (Kent), *The Immortalist* (Harrington), *The Immortality Factor* (Segerberg), etc. The avant-garde 10 percent of the population is already looking forward to the conquest of aging and the eventual conquest of death. When this message reaches 30 percent of the population, both government and private industry can be expected to invest in this research much more

Anti-aging drugs and life-extension techniques will soon deliver us from the curse of death, and within the next 40 years we will all be re-oriented to living centuries, not decades, and to pursuing the scientific quest for actual immortality. We have to expect such quantum leaps every decade now.

than at present. Assuming that the first breakthrough, however crude, will occur between now and 1995 is reasonable. Even if the first life extension drug only increases lifespan 10 or 15 percent the psychological impact will be immense. Expectations will rise, and research will accelerate even faster.

Far-out sociologist F.M. Esfandiary may not be excessive in claiming, "If you can survive the next 20 years, you will probably never die."

The Age of Space, of course, has already begun. Over 100 men and women have been into space; our TV brings us satellite photos every night on the weather forecasts, and has brought us pictures of Mars and Jupiter. As home computers linked up with satellites in space become more common, the sense will grow in all of us that we are participating in the Space Age even if we are staying at home. But the longevity revolution will certainly increase the "population problem" in everybody's awareness, so that migration into space will seem more and more necessary.

Since we already have communication satellites in plenty, the solar power satellites urged by California's allegedly "flakey" Governor Brown cannot be far away. After all, ground-level solar power collectors can only tap the sun's energy half a day at best, and not at all on cloudy, rainy or overcast days. Yet a solar satellite can collect energy 24 hours a day, every day of the year. Even with anti-tech bias in some circles these days, an idea like that cannot be long ignored.

Dr. Barry Commoner, one of the leading

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experts on ecology, pointed out at the 1980 meeting of the American Association for the Advancement of Science that, even before some kind of ecological disaster hits the planet, we will be in serious economic trouble, if we continue to base our economy chiefly on non-renewable resources such as oil and coal. It is a simple fact of economics that as a resource grows scarcer, its price goes up. (Looked at your gasoline bill lately?) If energy is not to become something only the rich can afford, Dr. Commoner says, we must switch to renewable resources pretty damned quick.

Solar power is the most abundantly available of all renewable resources, and satellites are the best way to tap a lot of it.

But such solar satellites are just the first step in our expansion into extra-terrestrial economy.

Engineer G. Harry Stine has calculated that there are  $10^{100}$  technical processes that can be performed cheaper or more efficiently in space than on the surface of a planet. This is an example of doing-more-with-less that might make even Bucky Fuller blink, but it is simple physics, based on the zero-gravity conditions and high-grade vacuum available in space.

In case anybody doesn't know,  $10^{100}$  means 10 with a hundred zeroes after it. This is quite a large number (says he with English understatement) and makes the Industrial Revolution look like a tempest in a teapot by comparison. It seems to mean that, as industry moves into space, the rate of capital increase

will accelerate much faster than the two percent per year that has prevailed since the late 19th century. In fact, it indicates that we are about to experience the greatest quantum jump in energy, resources and wealth since history began.

The word "we" in the above sentence is, of course, ambiguous. In guessing how much the Great Economic Boom of space industrialization means to the human race generally, rather than just to the multinational corporations, keep in mind: (a) The Third World liberation movements and other poor people's crusades are *not* going to go away. (b) Even under our present system of monopoly capitalism, living standards have steadily risen for the majority. (That is, contrary to Marx, capitalism has not meant that the rich always get richer and the poor always get poorer; rather, the rich continue to get richer, but fewer and fewer are poor in the 19th century sense. Our unemployed poor, on Welfare, are far more comfortable and healthier than the working poor in Marx's day.) (c) As the information-intelligence revolution continues, the deprived will find better, more rational ways to press their demand for a fair share of the pie. That is, it is easy to ignore, or refuse concessions to, a band of crazy terrorists; it is not easy to ignore a group of people as well organized as American labor today.

Bucky Fuller and Werner Erhard have picked 1995 as a target date for the abolition of starvation worldwide. This may sound hopelessly Utopian now—but that is only because we are so accustomed to stupidity and narrow greed in high places. Making every allowance for that factor of human cussedness, it seems reasonable to say that the Fuller-Erhard goal must be achieved in the 40-year span this article is considering. And there is no reason why we shouldn't aim for 1995; as any karate teacher will tell you, success depends on aiming at *more than* you think you can achieve.

And here's where the much-maligned Human Potential Movement comes into the picture. This was not invented in the 1970s, as shallow critics believe, but in the 1950s. It emerged from the interpersonal emphasis of psychologists like Harry Stack Sullivan, who realized that a "sick" person is just one part of a "sick" situation; and from the rising popularity of group therapy, replacing the old individual therapy; and especially from Dr. Abraham Maslow's discovery that healthy people are more interesting than sick people—i.e. that health is what psychologists really ought to study.

Freud studied the neurotic, and tried to restore them to normalcy, without a very clear idea of what normalcy was. Maslow studied the conspicuously healthy—the persons he called "self-actualizing individuals"—and found they were as far from the norm as the mentally ill are. Due to Maslow, psychologists began to realize that the normal state is rather dull and stupid. Emphasis shifted from treating the ill to "make them normal" into treating both the ill and the normal to make them self-actualizing, i.e. to show them how

to achieve their full potential.

Although there are now several branches or schools of the Human Potential movement, with several varieties of jargon and "psychobabble," the best summary of what the whole Consciousness Revolution is all about is, I think, that given by Dr. Leary in the previously mentioned *Intelligence Agents*.

As Leary states the case, there are eight varieties of consciousness-intelligence which we all potentially possess and which we can all develop to a higher general level than the present norm. These are:

**Bio-survival intelligence.** Using your body to avoid danger efficiently, as any intelligent animal does. We only learn this kind of consciousness if our major interest is sports of the more violent sort, like football. We can all learn more through martial arts such as kung fu, karate, aikido etc.

**Emotional intelligence.** Using the emotional circuits in your brain to understand other people's emotions, "where they're coming from," and how to relate to them when they seem irrational. In our society, only women seem to be trained in this kind of consciousness, and men are generally clumsy as oafs. Women's Liberation and the growing influence of Human Potential has made the *avant* third of the male population more or less aware of this, and the attempt to become more "sensitive" to others has at least begun. We can only expect it to increase (and the sooner the better).

**Semantic intelligence.** The ability to use words and other symbols without committing gross errors of judgement. This is the only type of intelligence which our schools even *attempt* to teach, and since we live in a deluge of words, symbols and other signals—and since the computer revolution is upon us—we all need to learn how to receive, integrate and transmit symbols more efficiently.

**Socio-sexual intelligence.** The capacity to relate to others without being exploitative and without being an exploiter. Our society traditionally treats sex as a special case, but it is really part of the whole social consciousness game. The rules are the same, in sex or in other relations between people: treat the other person as you want to be treated. At present, few have that degree of maturity, and most are either bullies or masochists. A great deal of therapy, group or otherwise, merely consists of teaching people a modicum of socio-sexual consciousness, so they can cease to be bullies or masochists.

**Neurosomatic intelligence.** The ability to stay "high," to look and feel like a happy, healthy young adult all your life. This is somewhat "spookier" than the previous kinds of consciousness, but only because it is still statistically rare. When somebody else transmits this to you, it called "Christian Science" or "faith-healing," etc. Maslow found that his self-actualizing people do it for themselves, without a guru. However arcane it may seem at present, this type of intelligence is increasing because weed has made *temporary* flashes of it familiar to about a third of the population, because biofeedback is showing us how to control it scientifically, and because

the Human Potential movement, and such exotic imports as Zen and yoga, are making it accessible to more people every year.

**Metaprogramming intelligence.** The capacity of the brain to become aware of its own programming, and to rewire itself for more pleasurable, more efficient, more successful programs. This is the goal of all the more advanced forms of psychotherapy and the Eastern mystic traditions. It means turning all your mechanical reflexes into voluntary choices—ceasing to be a robot and developing your full Human Potential—and it is still exceedingly uncommon. The whole Aquarian philosophy, of course, is based on the hope that this transformation of humanity from Mechanical Reactions to Creative Actions can be accelerated by the growing synthesis of Eastern and Western psychologies, by new discoveries in the neuro-sciences, and by the fact that the accelerated changes we are going through demand that our brains themselves accelerate and change.

Leary adds two further kinds of intelligence, which are so infrequent in our society at present that to talk of them at all sounds "mystical." These are *neurogenetic intelligence*—the capacity to intuitively grasp, through direct brain-DNA feedback, the Evolutionary script, the meaning of I<sup>2</sup>, and one's own role in the entire drama of I<sup>2</sup> emerging out of the primordial slime to higher and higher levels of coherence; and *neuro-atomic intelligence*, which has to do with the weird stuff that some scientists don't even admit exists, such as ESP and psychokinesis.

I think it safe to predict that, within the 40-year span of this article, we will have much more precise scientific knowledge about how to increase all eight of these levels of consciousness. In short, I think we can expect a quantum jump in human functioning, to greater intellectual efficiency, greater emotional sensitivity and stability, and more self-awareness, self-direction and zest-for-living.

Now let us look briefly at some of the other changes and breakthroughs that can be expected in the next 40 years.

**Human cloning will be possible.** (One sensational book, rejected by most scientists, claims that it has already occurred.) Some of the implications of this are so staggering that they make the wildest science fiction seem tame. One can imagine a dictator cloning a whole army of killer-zombies from some low-IQ high-muscle prototype, or some eccentric Sultan cloning a harem of Sophia Lorens, etc. Dozens of similarly bizarre fantasies will be possible, and one can only accept cloning if one believes that I<sup>2</sup> is really going to increase also.

More significantly, cloning will complete our sexual reorientation. Contraception has broken the sex = pregnancy "law" by making sex without reproduction possible; cloning will change our attitudes further by making reproduction without sex possible. A whole new definition of humanity, sexuality and sociality will emerge, which we can only dimly foresee.

*Cities in space* must inevitably follow space

factories. That is, neither male nor female engineers can be expected to put in long stints out there without the heterosexual majority demanding the usual companionship and, eventually, the traditional family structure. Since designs for space cities have existed since 1968, and have been improved several times already, real space cities are inevitable in our 40-year forecast.

People living in space will be as different from Terrans as the first settlers of the U.S. were from traditional Europeans. They will be the pioneer, maverick types—those who, if we trust Brooks Adams and Leary, have been moving westward for the last several years, dragging the rest of humanity in their wake, as they endlessly produce new ideas, new tools, new capital and higher levels of information processing. Since there is nowhere left for them to go on Earth, they will be leading the migration into space.

Or consider the following Utopian visions:  
—Drugs to permanently increase intelligence;  
—Artificial sight for the blind;  
—A cure for cancer.

Does it seem visionary to predict these within the next 40 years? A poll of scientists conducted by McGraw-Hill in 1977 found that the majority of informed researchers believe we will have all three within the *next 20 years*.

In fact, since these predictions were made in 1977, we have already seen the development of one type of very limited, very expensive artificial sight for the blind, in laboratory prototype only; and it has been discovered that one known drug, lecithin, can raise intelligence to a limited degree.

One psychiatrist, Dr. Robert Newport, has predicted that, within 15 years, psychotherapists will be mainly diagnosticians. That is, they will merely decide what is wrong with a given patient and then prescribe the right chemicals to restore the brain to equilibrium. This was perhaps uttered with some whimsy—but Freud himself predicted that such chemotherapy would make his work obsolete someday.

Dr. Nathan Kline has claimed that, by 2000, we will have such specific chemical brain-change agents as: drugs to increase or decrease mothering behavior, drugs to improve memory or to remove specific memories, drugs to prolong or shorten childhood or any other stage of life, etc.

It is hardly visionary, then, to project that, within our 40-year purview, we will all be able to program our nervous systems to add, subtract or multiply any behavior we wish to alter.

We have traditionally been limited and tormented by three factors which theology calls "the world, the flesh and the devil." As the French philosopher Bernal pointed out, in modern terms, the world means the limited resources of this planet, over which we have been fighting for the past several thousand years. Space migration means that we are no longer hemmed in by this limitation. We are moving from the closed system of Terra to the open system of extraterrestrial expansion.


The flesh, to Bernal, meant the brevity of

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human life—the grim fact that for most of us, senility, the other diseases of age, and death itself come upon us before we have begun to figure out what life is all about. Anti-aging drugs and other life-extension techniques will soon deliver us from that curse, and within the next 40 years we will all be re-oriented to living centuries, not decades, and to pursuing the scientific quest for actual immortality.

The devil, of course, merely represents our own inner irrationality. All that we have said about intelligence increase and consciousness expansion indicates that we are on the threshold of major victories against the most pernicious of the three traps that have previously constrained us.

That is, the world represents limits in space which we are outgrowing, the flesh represents limits in life-time which we are also outgrowing, and the devil represents limits in our own consciousness which we can also outgrow. We are evolving into an entirely new relationship to space, time and mind. The law of acceleration, increment of association, synergy, etc. are all aspects of the single fact that intelligence has been increasing more rapidly since life began. At first, major changes came only in billions of years, then in millions, then in thousands. After the scientific revolution circa 1600, we began to get used to rapid jumps every century. Some of us are now growing accustomed to rapid quantum leaps to higher coherence every generation.

We have to expect such leaps every decade now, to understand what the next 40 years will really be like. 

# Homegrown

# ROBOTS

By BARBARA KRASNOFF

**O**ne of the most remarkable things about the coming robotics age may not be the robots themselves, but the people creating them. Inspired by the science fictional automatons they have seen and read about, and tired of waiting for mass-produced robots to appear on department store shelves, many would-be roboticists are now building their own.

The range of these homegrown robots may not sound impressive: most of them can work their way around objects or give a pre-recorded speech; a few are, for the most part, simply remote-controlled machines. Compared to, say, the Martian landers of NASA or the industrial robots now being touted by the media, one may be inclined to dismiss these as amateur efforts. But take care! Keep in mind that most of these young scientists are between the ages of 14 and 20—if they are building robots today, just think what they'll be producing ten years from now!

## ISAC

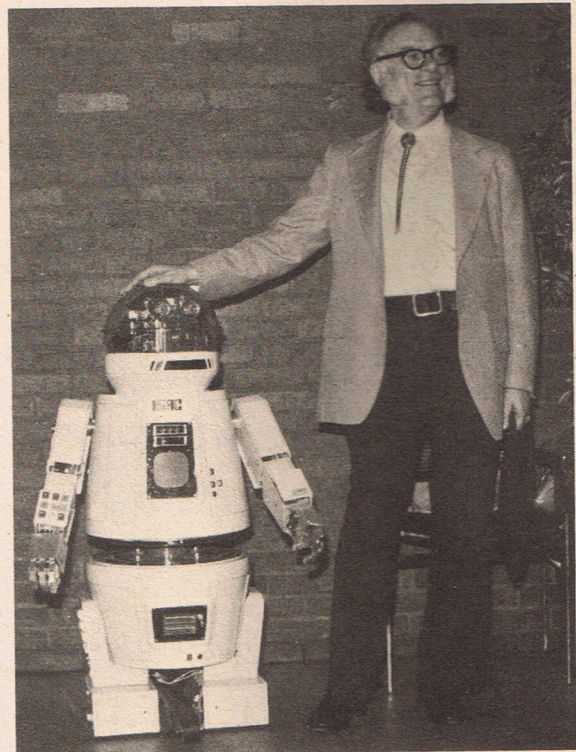
Fred Haber, a graphic designer from Albany, New York, is a great fan of Isaac Asimov's robot stories. "About two years ago," he recalls, "I got the idea of possibly building one, just trying it and seeing what would happen. I did some paper sketches and started coming up with ideas, bought a few extra tools for my shop, and little by little I started putting him together."

Together with electrical engineer Bob Sandborn and scriptwriter Carmine Angelotti, Haber now proudly exhibits his contribution to the robotic age: Isac. Constructed, as Haber admits, strictly for the fun of it, Isac's main function is to popularize the concept of robotics. "He can be programmed to talk, to make speeches for functions, dinners, commercials, that type of thing," Haber explains.

"He has arms with shoulders, elbows and wrist joints, his fingers open and close, his head turns, his waist turns, he moves in any direction. He also has a remote voice and he makes electronic sounds.

"For now, he's remotely controlled. What we're going to do in the very near future is go to total programming. In other words, we'll write a program on the computer, insert it electronically, and he'll go through the whole routine automatically."

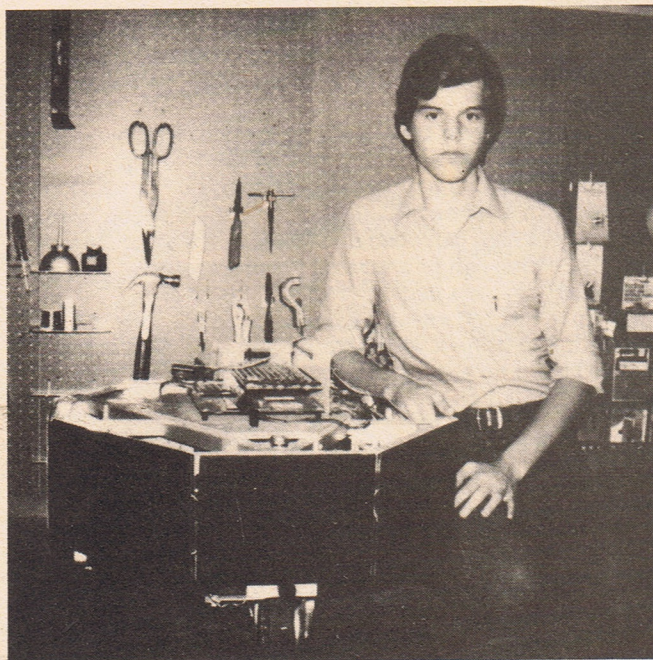
However, the trio has greater plans for Isac than simple self-propulsion. "We're going to have a certain amount of language stored," Haber says, "and he'll be able to recognize certain words and phrases and hopefully answer them, within reason. We're going to put sensors in, sonar types of things, so that he can recognize obstacles and work his way around them. Mostly it will deal with sensors that will do various things: pick up heat, light, sound. . . . In other words, you could put him in the middle of a room, and eventually he could get out of the room by recognizing things."



Isac, which cost about \$1,000 in parts ("In time and effort," asserts Haber, "I'd say it's valued at around \$10,000"), is not the last of the trio's robotic creations; however, plans for Isac II are hazy as yet.

But that there will be robots, there is no doubt whatsoever, at least in Fred Haber's mind. "I can see robots being used in the future in a lot of different areas," he says firmly. "I thought it might be fun to get in on the ground floor. The pioneering age, so to speak."

## MIKE



"When I was six years old," Tod Loofbourrow relates, "my family went up to see the World's Fair in Montreal, Canada, called Expo '67. I saw the automats there, and they just totally fascinated me. And since then I've always really wanted to build one."

"I guess it was the summer of 1976 when I actually sat down and started pulling out the electronics journals and the magazines, trying to get ideas. I started with a frame, and then just added a car battery and the power system, and . . . it was basically one step at a time. I didn't make an overall plan and then follow it. I just added one system after another."

The result was Mike (short for microtron), a rather

triangular but very talented robot that likes to explore. "It's got a little ultrasonic transducer in front which sends out ultrasonic sound," Tod explains. "Whenever that hits something and is reflected back, it knows there's an object in front of it. It's very much like a bat's radar. So it can essentially 'see' objects that are in its way."

"So what it does is, it explores an area. It'll enter a room, move around the room, sort of finding out where the objects are with its radar. It will bump into objects to figure out where they are (it has eight bumpers on its outside), and then it'll find the doorway of the room and go out. It's also equipped with voice commands, so I can call its name and it comes, tell it to go left, it goes left; right, it goes right...."

"Altogether it cost me about \$450, but I'm told it can be built now for somewhere in the \$300 range, because the prices are dropping."

With all this sophistication comes interesting problems. Apparently, Mike has a mind of its own. "The robot has bumpers around the outside, so when it hits something it knows there's an object there, and it can turn to avoid it," Tod says. "Occasionally the switches that form those bumpers get stuck, so the robot thinks it's being constantly hit by something. And it can go running across the room." He smiles. "I remember one time when I was demonstrating it on the stage, it thought it was being hit by one of the bumpers, and went shooting across the stage and almost dove off!"

It was during one of these stage appearances that Tod was approached and asked whether he'd like to write a book on robotics. "I was sort of flabbergasted," he recalls, "but it sounded like fun." The book, titled **How to Build a Computer Controlled Robot**, is now in its fifth printing.

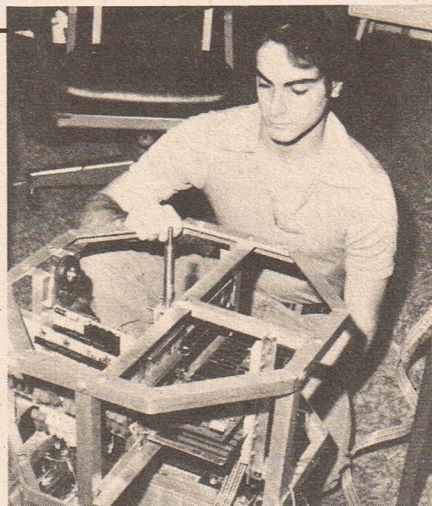
However, 18-year-old Tod, who will be entering Harvard this fall, does not really intend to pursue either robotics or electronics as a full-time career. "Robotics is mostly a hobby," he admits. "I'm probably going to be a liberal arts major, which may sound odd, considering my background."

## HERB

Holden Caine, an 18-year-old student at the Rochester Institute of Technology in New York, constructed a robot almost as a second choice. "I was into computers," he explains, "because my parents got one for their business. I wanted to build one, but there was no reason to build one because they already had one. So I decided to build a robot instead."

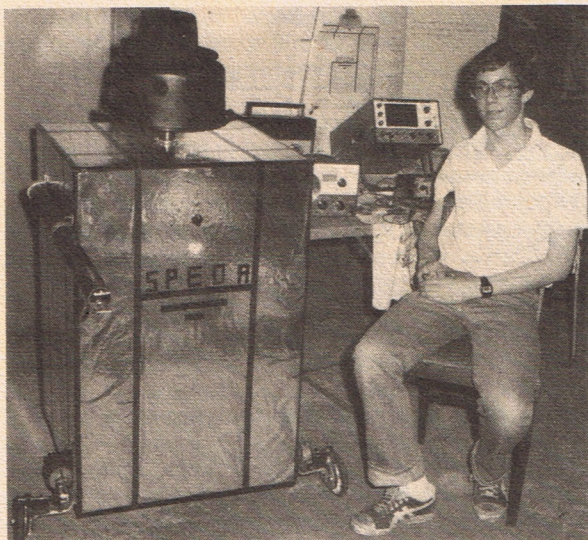
This was back in June of 1977. Robot Herb (short for Holden's Electronic Roving Brain) is now "alive" and well, and looking for light. Well, that's its function.

"It can look around for the brightest light," Holden says, "and when it finds it, when it sees it actually, it'll turn toward the light and head for it. If it hits something, it will go around the obstacle and find the light again. This way, it can go through a course and eventually get to where the light originates." Herb finds light through a sensor placed on its "turret," which is constantly turning and scanning the surrounding area. It finds obstacles through the bumper placed around its circumference. The robot can also follow a pre-programmed sequence of steps using a computer cartridge.



However, Herb's search for light is only a preview for the robot that Holden is planning to build sometime in the near future. This mechanical creature will be a little more compact and will be equipped with a working arm. And its purpose? "I want to get it to plug itself in when its battery gets low," says Holden. "Just let it run on its own, without anybody ever helping it."

# SPEDA



"For a long time I was just a little fascinated with these things," says 16-year-old roboticist Louis Steinberg. "I've been into electronics for a long time. It's a hobby of mine; my father's an electrical engineer and he's taught me quite a bit about it. I decided that the best thing to do would be to build an inexpensive robot, because I'd looked at how much it costs to buy these things commercially—\$10,000 a unit—and I projected I could probably build one for under \$300. I wanted to build one without cables, without radio control, so you don't have to be standing there when he goes through his motions." He smiles. "I succeeded for about \$290."

Steinberg's success is a walking, talking and grasping robot named Speda; short for Self Propelled Experimental Domestic Android. "I'm using a tone-decoding system," Louis explains. "I have a tape recorder inside the robot and I have programs made up in advance. On the tapes I have tones, or frequencies if you will. Speda electron-

ically decides what frequency you're playing in what combinations, and responds to the frequency. One frequency tells him to move his left wheel, one to move his right wheel; if you play both, he turns both on and goes straight; if you play one and stop the other, he'll turn left or right. . . ."

By using this new type of sound system, which Steinberg describes as similar to that used by the telephone company's touch tone system, he has provided himself with a very sophisticated household robot. Speda has a claw which can open and close, and a separate tape recorder which can be activated for prerecorded messages. "So for a demonstration," Louis says, "he'd walk up to me, tell me he's going to close his claw, I'd put something in it, he'd walk around and then he'd either tell me before he's going to let go, or he could walk over and put it down on the table."

"The idea is if we had a device like this—they are relatively inexpensive to make—we could have different tapes. One, say, telling him to vacuum the living room. It tells him to walk straight 2.7 feet and turn left 42 degrees, and he would be holding the vacuum the entire time."

However, Speda the houserobot isn't the only thing on Louis' mind these days. He is busy planning his next robotic creation. "You know those light-up billboards in Manhattan?" he asks. "There are a few hundred light bulbs on each. The way they change these light bulbs now is they hang people down on scaffolds and they remove dead bulbs and put in the new ones. If you could build these signs with tracks up and down on them, you could put in a robot that was built with a specific function. He could climb up and down these tracks and, using a photocell, as he passed each light bulb he'd detect if there was one out, stop, remove the bulb and put a new one in, and keep going. That means you don't have to hang people down. Just let it do the job for you, and probably attract a lot of publicity for the sign."

Louis plans to study electrical engineering in college, possibly combined with business administration. "And possibly the field of robotics," he adds. "Quite possibly."

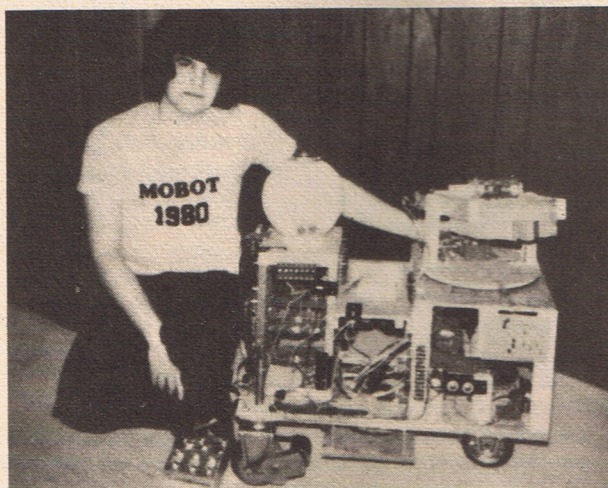
# MOBOT

Fifteen-year-old Peter Quinn seems typical of many technology fans who were introduced to science through film and television science fiction. He admits readily that his interest was first piqued by the amiable robot in the 1960s children's TV show *Lost In Space*. After all, what kid could resist wishing for an electronic companion like the Robot? This interest led, eventually, to his pet robot Mobot.

When Peter first began constructing his robot, he had several years of general tinkering behind him and very little else. There are not many books around describing the manufacture of even simple robots, and his high school offers no appropriate classes. "An elementary physics course," Peter shrugs. "Not much else."

Right now, Mobot is a simple, remote-controlled robotic unit. It can go forward and backward at three speeds, raise and lower itself, emit electronic-type sounds and pick up a load of up to ten pounds. However, it is not yet programmable.

Peter hopes to change that in the near future by using a computer to program his Mobot towards independent



movement. But computers are still expensive these days, so "I'll probably make it myself," he says casually.

"I'd like to go into robotics," Peter continues, talking about his future. "But there are no college courses in that, so I'll probably go into electronic engineering." *[E]*

# harlan ellison

## AN EDGE IN MY VOICE

I despise writing obituaries. Nor had I intended this second outing to be any such thing: I had intended to talk about Ridley Scott and an interesting conversation we had a few months ago.

But George Pal dropped dead on Friday, May 2nd; and in the torrents of sorrow that wash over me at his passing I find myself unaccountably, against my will, clinging to a sharp, black rock of bitterness that prevents me from being swept over the falls and down the cascade of maudlin sentiments certain to present itself.

If you never met George, you are the poorer for it. He was a dear man. Beyond his unquestioned vision and expertise in matters cinematic, he had a genuine love and understanding of fantasy and science fiction at the highest levels. He was kind, he was gentle, he was conscientious; he was a *gentleman*. A word fallen either into ill-repute or into ridicule: the former because duplicitous thugs like Nixon or David Begelman have hidden behind the term, using it as misdirection while they carried on their criminal activities; the latter because it bespeaks a mien, a sense of personal integrity that doesn't sit well with an encroaching cultural scene festooned with boobs who pierce their earlobes with safety pins and consider more than one exposure to bathwater every fortnight a social gaffe.

And it is George Pal's unrequited devotion to gentlemanliness, to *personal integrity*, that causes the bile of bitterness to rise up in me as I contemplate his death by heart attack at the age of seventy-two.

Because for the last decade and a half, Hollywood let him languish in outer darkness.

That obsidian rock of bitterness will not allow me to weep the fat crocodile tears currently sweeping through the often-linked worlds of science fiction and motion pictures. Now that he's gone, it's warming and succoring to remember dear old George and how much he contributed to the melding of sf and movies. It's charmingly hypocritical but nonetheless guilt-assuaging to talk about *Destination Moon* and *War of the Worlds* and *The Time Machine*, his box office triumphs, while ignoring the fact that it was seven years between the unsuccessful *The Power* (1967) and the even more commercially disastrous failure of *Doc Savage, Man of Bronze* (1974). Seven years during which, in the vernacular, dear sweet old George couldn't get arrested in this town. Seven years of hustling, of trying to put together a deal, of taking ideas from studio to studio, trying to "blue-sky" them so he could get development money. Seven years trying to do what he loved to do... make movies.

And six years after the failure of *Doc Savage*, George was still hustling like a

newcomer; having to talk sweetly to the much-vaunted "baby moguls" one-fourth his age and one-millionth his talent; having to eat the corporate rudeness and offhand treatment; having to make appointments to visit these ex-agents, ex-time salesmen; ex-pr men, ex-vacuum cleaner salesmen who have jumped up into executive status; having to smile when the appointments were broken because something "more important" had come up to turn the executives' attention, usually to the latest "hot" director or producer; having to smile when not even the executive but the executive's secretary called to say, "Mr. Mogul will have to cancel his meeting with you next Thursday, Mr. Pal. We'll call you when another, later date opens up." Having to smile and bear the thousand insolences of the untalented, the dull and the meretricious: simply because they were the conduits to the development deals.

God, the ugly irony of it! That the one man who should have most benefited from the current boom in science fiction films became the man most excluded. The man who took the risks thirty years before the conservative second-raters began gorging themselves at the troughs was the man they chose to ignore to the point of total dismissal.

How it must have pained him these last fifteen years. How his soul must have cried out—not for victory, or triumph, or great wealth—simply for the *chance*. For a decently financed opportunity to get in there and create something fantastic with the new technology, the liberality of subject matter, the budgets that produced for twice the money, half what *he* had done on a shoe-string.

And I sit here three days after learning of George's death, choking on black hatred and rancor at an industry too quick to dismiss its pioneers, too busy to be kind, too self-involved with its little rodent games of power and prize to honor with another chance those who were there before it was trendy. And here I sit with guilt, because I was in a position to help him... and I didn't go all the way.

I cannot hide from the nasty truth that I am one with those of whom it can be said dealt him "more honoured in the breach than the observance." There is a coppery taste of self-hate in my mouth as I cling to the black rock.

One with the approximately 140 others who attended the 1976 Nebula Awards banquet of the Science Fiction Writers of America at the Century Plaza Hotel in Los Angeles, I too stood and cheered, leaped to my feet and applauded as George Pal was given a special plaque by David Gerrold in behalf of the SFWA; a chunk of wood and metal to honor George's achievements in film that predated the birth of the Nebulas. It was easy to stand and cheer, and it seemed to

make everything okay.

But it was merely another manifestation of the ways in which we liberalize our responsibilities to those who seek no honors but ask only for the chance to *produce*, to be allowed to work at their craft. It was eyewash, no matter how sincerely tendered. Because George was still beating the pavement trying to get a project on the wing.

And when he began calling late in July of 1979, asking me to come in on a project to do an updated version of *When Worlds Collide*, I thought only of the book I was writing, of the film I had just contracted to script, of all the deadlines I'd missed and the scarcity of time in any given day.

But he persisted. He honored me in the highest fashion by wanting to work with me. And finally I said I would try to help him get a deal going. Big man proffering largesse.

He had Universal interested. A young executive named Peter Saphier had expressed interest. I agreed to have a meeting with George and Saphier, but I said it was twenty-eight years since the original film, times and the way we look at films had changed, and to make simply an updated version of the old Wylie-Balmer book would be to stalk once again across terrain already scorched by *schlockmeisters* like Irwin Allen. I suggested he get a copy of J.T. McIntosh's excellent 1954 disaster novel, *One in Three Hundred*, which I felt could be combined to salutary effect with *When Worlds Collide* to humanize and make more contemporarily relevant, to make more suspenseful, the skeleton plot of the original.

George found an old Ace paperback of the book, read it, and called me to say he thought

(continued from page 57)



ARTWORK: © 1980 STEPHANIE O'SHAUGHNESSY



# BATTLE

## BEYOND THE STARS



Above: The peaceful citizens of Akir go to pieces. Opposite page: Sybil Danning defies gravity.

By ED NAHA

**T**here are some things in Hollywood that seem timeless. The famous Brown Derby restaurant, for instance. Sunset Strip. The legendary "Hollywood Land" sign. Roger Corman.

Roger Corman has been making movies for nearly three decades: ambitious, low-budgeted affairs that have usually transcended their monetary restrictions and gone on to spawn cinematic trends. It was Corman who almost single-handedly brought respectability to the horror genre during the 1960s with his atmospheric Edgar Allan Poe series. It was Corman who launched the motorcycle teen flick full force with the infamous *The Wild Angels*. It was Corman who kept American International Pictures rolling for years—via his amazing output of "B" movies of every length and format.

A lot has changed in Hollywood since Roger Corman first embarked on his dizzying career as screenwriter/director/producer.

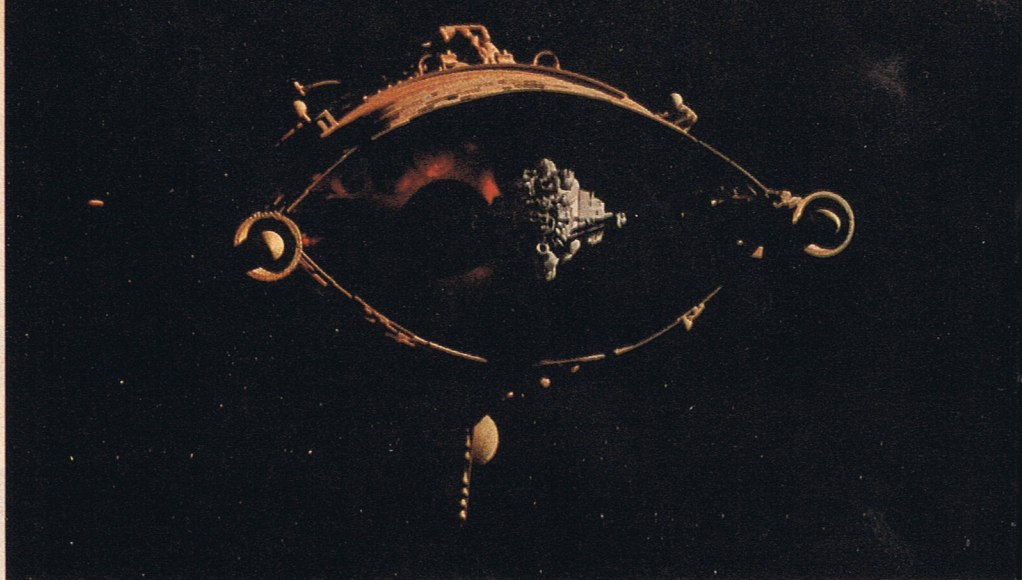
Production in Hollywood has slowed to a trickle. Television has embraced the concept of the "B" movie to its bosom and christened it high drama, and the teen-exploitation angle is now the firm foundation of ABC-TV's programming success.

Somehow, however, Roger Corman has remained unaffected by changing times and trends. Now the head of New World Pictures, the last large-scale bastion of independent movie-making in America, Corman is both producing such homegrown efforts as *Deathsport* and *Death Race 2000* and importing productions like *The Tin Drum* and *Cries and Whispers* in an effort to keep alive the vibrant sense of variety which once permeated Hollywood in its more adventurous years.

This year, Corman is entering the science fiction field in a big way; his six million dollar space swashbuckler *Battle Beyond the Stars* is the most ambitious and expensive film

**Roger Corman's crew not only had to battle aliens during the filming of his new science fiction film, but firemen, floods and fatigue, too.**

Right, above: The Malamori ship engulfs a minuscule alien craft.



Right, middle: Sybil Danning, Darlanne Fluegel and Richard Thomas.



PHOTOS © 1980 NEW WORLD PICTURES

Above: Lizard-like alien Cayman presented unique makeup problems.

Right: George Peppard as Cowboy on board his down-home rocket ship.





PHOTO © 1980 NEW WORLD PICTURES



PHOTO © 1979 NEAL PRESTON

Above, right: George Peppard relaxes on Akir. Above: Filmmaker Roger Corman

of his 30-year career.

Scripted by John (Piranha, The Howling) Sayles, *Battle* concerns the efforts of a young humanoid, Shad of the planet Akira, as he defends his peaceful homeland against the forces of the villainous Malamori. In order to effectively protect his world, stalwart Shad must raise an army of mercenary alien soldiers. Therein lies the film's plotline.

With *Battle Beyond the Stars* now making its way to theaters across the country, veteran filmmaker Roger Corman sits in his New World Pictures Los Angeles office and reflects upon his spacey accomplishment; a film that was waiting to happen for nearly half a decade. "I had been wanting to do a big budget science fiction film for many, many years," he confesses. "As you may know, my first movie was a science fiction film, 25 years ago (*The Monster On The Ocean Floor*, 1954, his first genre effort). Most of the science fiction films I've done since that time have had very small budgets. I tried for years to do something grander but I couldn't get the financial backing. Ironically enough, I had a deal with 20th Century-Fox a few years ago whereby I made a series of pictures for them at a million dollars each. They considered that low-budget. I wanted one of those films to be science fiction because that would have allowed for the biggest SF movie of my career. They weren't certain that science fiction would sell and said no. A year later they okayed *Star Wars*." Corman shrugs. "Those are the breaks of the game.

"But *Star Wars* turned out to be the picture that allowed me to move up in budget. It

convinced people that more expensive science fiction films were feasible. I had no problem financing this one." With Corman putting up half the money and Orion Pictures putting in the rest of the cash in return for foreign rights, Corman began preparing for his *Battle*.

"I was actually going to make this film last year," he reveals. "But the bids I had gotten on the special effects were so expensive that, although I was going to spend more than I had ever spent before, we still didn't have enough money. I had a great conversation with John Dykstra, who had done work in *Star Wars* and *Galactica*. He read the script, liked it and wanted to do it. He said that he'd handle effects for two and a half million dollars and a couple of points of the profits. I said 'Gee, John, I really like you. You're a talented guy. One of the best. But my entire budget for this movie is only two and a half million.' Faced with problems like this, I did the only thing I could do: I raised more money and I went into the special effects business myself."

During these early days, when *Battle* was no more than a proposed skirmish, it became apparent to Corman that the movie was going to be an uphill fight to produce. "The logistics and the preparation were difficult," he admits. "I started my own studio just to make this film. I bought an old lumber yard in Venice and converted it into a studio with sound stages, a cutting room, a special effects department, etc. The construction in the studio was delayed and we didn't get the official go-ahead from the city until the night before the shooting was to start. In other

words, we didn't know that we could use the building until 24 hours before the cameras were set to roll. When I was younger, I coped with these unexpected problems with enthusiasm. Now, I cope with them with a little bit of enthusiasm, a little bit of resignation and quite a bit of exasperation."

While wrestling with the physical problems presented by the movie-to-be, Corman managed to get hold of a solid shooting script fairly simply. Approaching novelist/screenwriter John Sayles with the idea of putting together a story based on "The Magnificent Seven in space" approach, Corman wound up with an action-packed shoot-'em-out in hand. "The text, the surface," says Corman, "gives us an action-adventure picture set in outer space. The sub-text, beneath the surface, is the story of a clash of many cultures and the interactions between these cultures. So *The Magnificent Seven* or, if you go back even further, *The Seven Samurai*, provided the framework for the action. That's all."

After nearly two years of pre-production, cameras were ready to roll in the spring of 1980. Richard Thomas was cast as Shad, the spaceboy. John Saxon was inked to portray arch-villain Sador. Robert Vaughn, Darlaine Fluegel, George Peppard, Sybil Danning, Sam Jaffe, Jeff Corey and Marta Kristen were tapped for various alien ally roles. Jimmy T. Murakami was tagged as director. Construction of the sets began... and then stopped... and then began... and then stopped... and...

"As a lapsed Catholic, I was tempted to return to religion," Corman laughs. "All hell broke loose on this movie in a very subtle way. Our worst problem was no one problem. It was the co-ordination of the combination of the sets, the set dressing, the props, the physical effects and our six-week live action shooting schedule. It's a very complicated, intelligent picture and we had a great many sets to design and construct in a very small amount of time. As a result, we had crews working every night, trying to stay ahead of the cast and cameras. They were working straight through Saturdays and Sundays. That crew never saw the light of day. They never witnessed the shooting of the picture. They came in after the shooting was over, worked all night and were gone before shooting began the next day."

Adding to the impromptu hilarity of an already hard-pressed schedule was a sudden mid-stream switch of art directors, a series of seemingly never-ending rain storms which soaked California for nearly a solid month and a group of sets that never seemed to be totally ready when the actors showed up for a scene.

"It was really nuts," Jimmy Murakami laughs. "The biggest challenge for us was covering the vast amount of material in the script. There are a lot of scenes on a lot of different spaceships. This meant we had a lot of interior shots to set up. Basically, we were working on one stage. We had a whole crew working nights trying to put the stage together for the following day. Sometimes we would fall behind because the set was still under construction in the morning. We had

to get our first show in as soon as possible. It was something we *had* to accomplish because we were tied into a six-week shooting schedule.

"The actors were really great. They looked upon it as a form of pleasant insanity. We protected them from the real madness as much as possible, of course. We'd block the scene with the actors and have a quick rehearsal. Then they'd leave and we'd light the scenes as quickly as possible using their stand-ins. The actors, thank goodness, weren't around for most of the hardcore franticness. We spared them as much as we could from the hassles and the fighting and the pain that came up before we were ready to shoot. If they had been on the set during the set-ups they would have been very depressed. We were all running around like complete madmen."

Most of the craziness connected with the making of *Battle Beyond the Stars* was a direct result of a Pandora's box of production quirks which popped up despite months of preplanning. "The things we were up against were unbearable," Murakami moans. "We had a front projection system we were using on the planetary surface scenes to make the effects look more immediate. That kind of set-up takes a lot of physical adjustment. We used it on five different scenes on the planet Akir and none of them turned out right. Then we built a city center on Akir and another maze set out of spray-on styrofoam. The fire department showed up one day and told us the material wasn't safe. They ordered us to destroy it. Fortunately, we had gotten most of the city scenes shot before we had to get rid of the set. But the maze interior we never got to use at all. We lost days on this stuff. How do you plan for problems like that?"

On a more personal level, the actors' alien lifestyles brought about some equally challenging budget-breakers. "The makeups drove us up a wall," says the director. "The prosthetics took forever to apply. We had a lot of aliens running around on this movie and it took up a sixth of a morning to make them all up. During that time, we'd try to shoot around them using just the recognizably human actors. Cayman's makeup was the worst. He's a lizard man and the heat on the set would cause his makeup to slowly lift off his eyes. We'd have to go back and get his reptile head repaired constantly."

*Battle's* alien garb also brought about its share of woe. "Sybil Danning plays St. Exmin, this beautiful Valkyrie warrior," Murakami recounts. "She had two big costumes: one for battle and one for her scenes on land. They were both quite revealing. We had to worry about keeping her nipples covered all the time in order for us to get a PG rating. Her belly button, too. For some odd reason, censors really dislike seeing nipples and belly buttons. You can have almost an entire breast oozing out of a costume as long as you don't show a nipple. I don't understand it, myself. The costumes were precariously worn. We had some problems with 'fall-out,' but Sybil's European and she's used to this sort

of thing. After a few incidents of that nature happen on the set, you don't even look up any more when it happens." Murakami pauses reflectively for a moment. "She's got really big breasts. No doubt about it. She's a really good actress, though."

Despite the rigors involved in her costuming, Sybil Danning found her character of St. Exmin to be a rock of stability during a sometimes hectic shooting. "The character of a female mercenary fascinated me," she says. "St. Exmin has twice as much of a challenge as the rest of the bunch, in that she had to fight to get the chance to even be included in the group of male warriors. She had to face Shad's attitude of 'You're just a woman, go away.'"

"Her culture is totally different than Shad's peace-loving one. Her credo is 'Live fast, fight well and have a beautiful end.' When Shad expresses a negative attitude towards this axiom, she smiles and says 'Well, you've never seen a Valkyrie go down.' There are double entendres like that all throughout the script."

In spite of the fact that St. Exmin is obviously a dazzling beauty with a voracious appetite for both sex and battle ("On her planet, the boys and girls are segregated in separate schools until the age of 17. Then the two schools are brought together and all hell breaks loose!"), Danning sees her character in fairly demure, contemporary terms. "She's the equivalent of a working-day woman who is married and has children and a job. She goes out into the world and earns her keep and then comes home to her family and protects them and loves them. St. Exmin has that dualistic nature."

But what about her dualistic costuming? "Well," Danning smiles, "I wouldn't mind being known as the film's sex symbol. I've done other, grittier roles so I'm not afraid of being typecast. I played a terrorist with Klaus Kinski in *Operation Thunderbolt* and Ernest Borgnine's ragged wife in *Crossed Swords*. The change is refreshing. I wouldn't mind being merchandised as St. Exmin because I adored the role so much. Everyone loves a hero. I wouldn't mind St. Exmin dolls being bought by little girls around the world or even little boys. For little boys, St. Exmin is a great fantasy. They love her for her fighting skills and willpower... she's also quite a sexy lady. She's definitely going to be in a lot of little boys' dreams. Maybe a St. Exmin poster would be popular. I'd love to be above all the boys' beds, smiling down at them while they sleep."

All the actors involved in *Battle* seemed to enjoy their roles, albeit slightly less passionately than Danning. Robert Vaughn, who plays the man-in-black warrior, Gelt, found eerie similarities between this role and his man-in-black cowboy, Lee, in the original *Magnificent Seven*. "In a way," he deadpans, "this role brings things full circle for me insofar as the 'hired gun' concept is concerned. I've done it in the western setting and now I'm doing it futuristically. It's too bad I couldn't have been in the original Japanese Kurosawa version as well."

As warrior Gelt, Vaughn had to partake in quite a few space fight scenes, a task he approached with some reservations. "I'm a little bit nervous about ray guns," he explains, "because of an experience during the filming of *The Man From U.N.C.L.E.* where I was incorrectly wired for a special effects scene. The electrical charges shorted out on my chest."

Marta Kristen, a veteran of TV's *Lost In Space*, saw her return to the science fiction fold as a personal triumph. "I play Lux, an adult in this movie. It's a much nicer part than the role I had in *Lost In Space*. I didn't have too much of an opportunity to be myself in that show. I was sort of the blonde bimbo running around in the background." The actress heaves a good-natured sigh. "But I was younger then."

"This movie was crazy but fun. It was the best crew I ever worked with. Roger Corman is very nice. Very quiet. Very nervous but, what the heck, it's his money. The pace on this movie was terrific. It was like filming a television show. There wasn't a lot of time to rehearse, so we'd just do it a couple of times and that would be it. My first scene was a love scene with George Peppard. I had never met him before. It was 'Oh, hello, George... lie down, George.'"

Kristen emits a giggle. "Actually, it's a family film. You know, a healthy handshake and a kiss. I really have to say, though, that working on this picture was great in a dizzy way. Things were always happening. We were filming in a flooded studio during the rain storms so we wound up walking around alien landscapes 'squishing' on the carpets. Then everyone caught this terrible cold. I don't know how we all survived. Everyone was coughing constantly. It sounded like Katmandu. Hack. Hack. Hack. You could imagine miles of bile. We were pioneering a whole new effect, I think."

"The alien characters provided some fun moments, too. We have Nestors in this film. Nestors are our clones. So we had unbearable clone jokes constantly. You know, they'd set up the scene and then yell 'Send in the clones.' We'd all 'boo' after a while. Then John Saxton, our main villain, is a fellow whose body is composed of different parts of heroes he's overcome. He's got to be the worst villain around. Yccccch. That's a strong interpretation of evil."

"Filming our space scenes was weird, too. You'd complete a take and then find out that there was someone sitting up in the background smoking a cigarette. We had to watch all our extras during those scenes, too; making sure they had taken off their wristwatches and gold chains. Making matters even more confusing, the sets and the props were always changing. It was magical. You'd walk in one day and there'd be a gigantic maze to run through. The next day it would be gone. If Jimmy had to re-do a shot, they had to reconstruct the set from polaroids of the original one."

"The sets were beautiful when they were finally constructed," affirms Sybil Danning, (continued on page 57)

## Dolphin Murder: A Tale of Atrocity

*(Editor's note: The first installment of Earth Control (FUTURE LIFE #12) reported the efforts of The Greenpeace Foundation, an international group striving to restore Earth's faltering ecological balance. A later article defined the concept of ecology. In essence, ecology is the purpose of Earth Control, to inform readers of situations that may be not only inhumane, unjust or blatantly corrupt, but are at the same time unnaturally blemishing the complexion of Mother Nature. What follows is a photo and story of events that as of yet have no proof of ecological miscarriage. However, they are of such a gruesome magnitude that public attention must be given them. As in human wars, while the species Homo sapiens has never been in danger of extinction, the atrocities are such that they cannot and should not go unnoticed. If this article stirs you one way or another, please do something about it.)*



Each year, thousands of dolphins are systematically caught and brutally murdered by Japanese fishermen. The fishermen claim that the cetacea are eating the buri and dramatically reducing their catch; environmentalists argue that the fishermen themselves are causing the shortage through unwise fishing. In either case, the dolphins are still dying.

Dexter Cate had been sitting in a Tokyo jail since March 7. Payment of his \$2,000 bail had been repeatedly refused by Japanese authorities due to improprieties in his visa. Even when the document was corrected, Cate was not released. At this writing, Cate has gone through a three-part trial and been found guilty. The judge gave him a three-year suspended sentence. His crime: Cutting fishing nets and releasing trapped dolphins before they were slaughtered by local fishermen in Japan's Iki Islands.

The Japanese are infamous for their total disregard for marine mammals' lives. The Japanese whaling industry, despite international condemnation, is notorious for killing thousands of cetacea, many of them endangered, annually. Dolphins are also high on their hit list.

Twice yearly, in March and November, dolphins migrate to the western Pacific, including many of Japan's outlying islands. At various sites, thousands of these highly intelligent mammals are viciously murdered, in some cases for human food, in others for "interfering" with fisheries' activities. For the past several years, Dexter Cate, the director of Greenpeace Hawaii and a field agent for The Fund for Animals, has traveled to the Orient to study dolphins—not to interfere with the slaughter, though the brutality of the actions has not gone unnoticed by Cate. Here is part of his report from Tokyo last year:

"As I arrived at Kawauna Harbor, just three hours by train from Tokyo, the dolphins were still outside the harbor, confined in nets that were slowly forcing them towards the mouth of the harbor. There were about 300 dolphins. Only after I had walked out to the end of the pier did I realize the true horror before me. The harbor was blood red. This was the second roundup that morning. With a quivery feeling in the pit of my stomach, I

watched fishermen on one of the surrounding boats throw a spear into the milling dolphins. A dolphin convulsed. The random throws served to keep the dolphins panicked and confused, preventing escape by ensuring cohesion of the group. The uninjured would not abandon the wounded ones. The captured dolphins were then winched ashore. . . . Whistling in distress, they flopped about on the concrete, gushing stomachs slashed open, fully conscious and in terrified agony. A fisherman near me severed the heart deftly from a quivering dolphin and tossed it aside. It landed at my feet, still beating."

The fishermen of the Iki Islands make their living catching buri fish, a tuna species. Over the years, the fishermen have claimed (with no scientific backing) that hungry migrating dolphins dramatically reduce the buri population; therefore, according to the fishermen, the "pesky fish" must be exterminated. They proceed to drive the mammals into a bay, surround them with nets, arm themselves with knives and lances, take aim at crucial blood vessels and murder as many dolphins as possible. The dolphins are ground into feed for livestock.

Last March, again on an educational project to study the reported high incidence of mercury in Japanese dolphins, Cate witnessed a dolphin slaughter at the Iki Islands. This time he could not contain his outrage. Threatened not only by legal repercussions, but also by a raging storm in the bay, Cate set out at 6:00 p.m. on the night of Feb. 29 in a one-man kayak with only a knife and a heart filled with vengeance. He made his way to an area of the net and slashed a 20-foot gap, guaranteeing the escape of hundreds of dolphins. Within a week, Cate was arrested, indicted and subsequently jailed and brought to trial for "malicious interference with business." According to The Fund for Animals, the Iki fishermen had rounded up approximately 1,000 dolphins; only 300 escaped. (A few days later there were reports that at least 4,000 dolphins had gathered around the bay and prevented the fishermen

from getting their boats out. As much as I wanted to believe that the animals were finally rising up to fight back, the story has not been confirmed.)

Cate pleaded not guilty. His purpose was clearly and admittedly to play the case to the maximum, thereby stirring public sentiment. A Japanese lawyer took the case (and as yet has not presented a bill) and the U.S. State Department offered some unofficial gestures to the Japanese to expedite the matter. Cate has garnered strong support from environmental groups world wide and even the Japanese press, at first highly critical of his actions, has started to listen to Cate's side of the story.

Cate's trip to Japan last spring was to confer with officials there concerning several studies which show that dolphins being fed to humans and animals in Japan are dangerously high in mercury, a known killer. It is sadly ironic that fishermen are slaughtering animals that might well be killing their fellow citizens.

Further irony is found in the argument by the Iki fishermen that the passing dolphins are interfering with the buri harvest. Environmentalists claim that the decline of the buri is in fact caused by unwise fishing in the area. Dolphins often feed on squid, which live farther offshore than the buri. However, with overfishing of squid, the dolphins are forced to move toward shore, where they feed on the more plentiful buri. Furthermore, while Japan has stated that the dolphin population has risen significantly, it should be noted that one of the reasons offered is the dramatic loss of killer whales (orcas) which prey on dolphins. A possible explanation for the disappearance of the orcas: indiscriminate Japanese whaling.

Humans are coming closer and closer to unlocking our communication gap with marine mammals, especially dolphins (see the article detailing such work by Dr. John Lilly in FUTURE LIFE #20). Wouldn't it be a shame if once the key was found no one could find any dolphins?

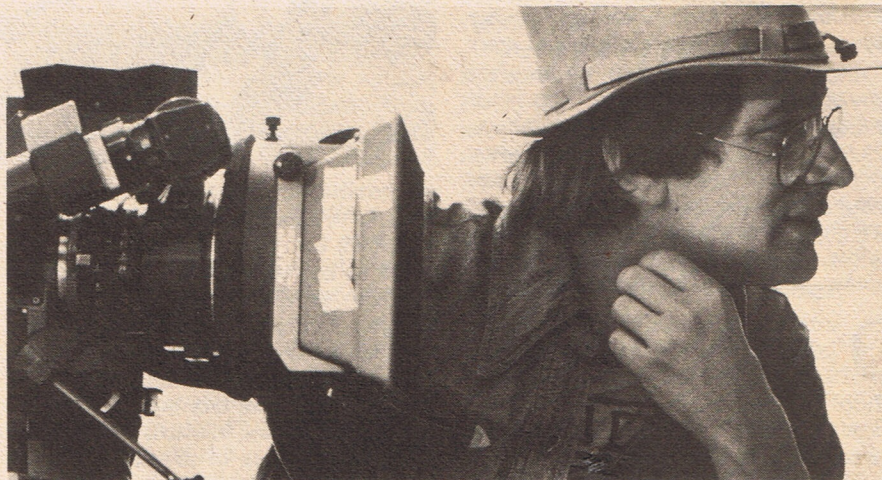
On August 1, 1980, Columbia Pictures and filmmaker Steven Spielberg will do what, in Hollywood terminology, is considered the unthinkable. They will re-release Spielberg's 1977 UFO extravaganza *Close Encounters of the Third Kind* in an altered, Special Edition format. Although it's not the long-awaited *Close Encounters* sequel promised by Spielberg three years ago, the Special Edition will feature a streamlined narrative and extra special effects footage which will take its main character, Roy Neary (Richard Dreyfuss), and its audience onboard the film's magnificent mothership for the first time.

The re-release of the Special Edition is just the latest development in Spielberg's ongoing fascination with the subject of unidentified flying objects. At the age of 16, the filmmaker lensed an epic "home movie" entitled *Firelight*. Shortly after the premier of the original version of *CE3K*, Spielberg referred to his mammoth saucer-fest as a "sequel" to his teenaged production. "*Firelight* started it all," said the director. "It was two and a half hours long and about strange lights in the sky. But it leaned much more towards the hard core sci-fi approach. Materializing from these lights came things with jaws that ate people. It was part of a 1950s movie trend that was very popular at the time."

Following his success with *Jaws*, director Spielberg again returned to the realm of UFO phenomena and, with a budget of \$18 million, lensed *CE3K* over a period of two years. Lending his expertise to the original version was special effects wizard Douglas Trumbull. For the intricate effects required for the movie, Trumbull and his crew took over an entire 13,500 square foot building, converting it into a complete movie studio. Installed were rooms for developing, optical printing and editing; elaborate filming "stages" with dolly tracks running horizontally and vertically, and electronically operated control booths; a metal shop, a wood shop, a paint shop and a small shop used for the construction of miniature sets. There were also areas for maintaining the intricate cameras and lights needed for the never-ending experimentation required for the nighttime UFO flight scenes.

The completed movie, released in 1977, followed the adventures of UFO-sighter Neary in his attempts to come to grips with an apparent coverup by the U.S. government of a rash of UFO sightings. Although his wife (Teri Garr) dismissed Roy's obsession as a somewhat benign form of madness, Jillian Guiler (Melinda Dillon) was far more sympathetic, her son having been kidnapped by a huge flying saucer. Meeting up with ufologist Claude Lacombe (Francois Truffaut), the twosome eventually found their way to Devil's Tower, Wyoming, where a fleet of saucers led by a massive mothership landed for an initial meeting with the human

# CLOSE ENCOUNTERS OF THE THIRD KIND FOR THE SECOND TIME



Above: Steven Spielberg on the original *Close Encounters* set. Opposite page, top: UFO-extravaganza. Opposite, bottom: Richard Dreyfuss, in new footage, is amazed at what he finds aboard the mothership.

race. A small band of humans, Neary included, marched onboard the saucer following an encounter with a swarm of child-like humanoid aliens. What happened inside the ship was anyone's guess in 1977. It was clear even then, however, that Spielberg wanted to take the encounter session even further.

Following the movie's premiere, the filmmaker commented on the casual meeting between the species. "There was a time when I wanted more than a physical exchange between us and them. But I felt that, even with such fantastic subject matter, there are boundaries of reality; just certain things that we as people are willing to accept. When you cross those boundaries the film falls into sur-reality or complete nonsense. And I wanted to keep it formal and gentle and a little bit strange. Maybe for the next meeting they will actually shake hands. I don't know."

In 1979, during the filming of *1941*, Spielberg felt the time was right to stage a second meeting. *Close Encounters* has returned over \$125 million in rentals to its backers, proving itself an enormous success. Going back to his original 160 pages of script, of which only 135 pages had been lensed, Spielberg approached Columbia with an update idea. The end result was that Spielberg was given permission not only to shoot the

originally planned ending but also to re-insert many of Douglas Trumbull's original effects that were edited out of the initial movie. Spielberg began filming on weekends in 1979 while still working on *1941* weekdays. For the new footage, Spielberg contacted special effects technician Robert (Star Trek—The Motion Picture) Swarthe and longtime friend Alan Davian (director of photography).

Explaining his rather off-the-wall re-evaluation of *Close Encounters* Spielberg offers: "Filmmaking should never be a dry-cement process. You can often have different ideas or feelings about a film months or years later and there are points that can be added to improve the story's impact. It's not often that you get a chance to change the work to match your vision."

Trimming down the film's middle section (concerning Roy's monomaniacal pursuit of telepathic clues left in his mind during his first sighting) and adding new footage, Spielberg has concocted an experiment in film with which he is quite happy. "The new footage takes Richard Dreyfuss one step further," beams the director. "But the mystery still exists in the Special Edition. I'm glad I was able to enhance the work to meet my original vision and I'm happy that a film company would agree to such an unorthodox plan."

By ED NAHA



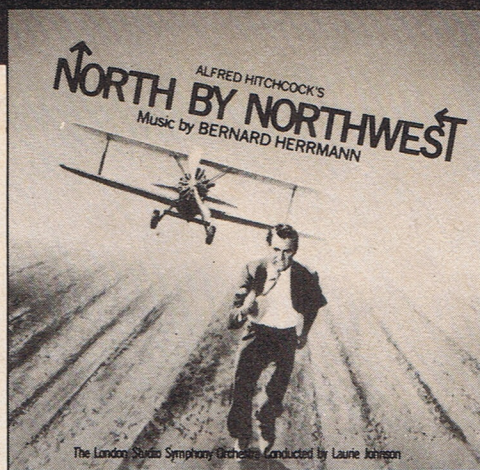
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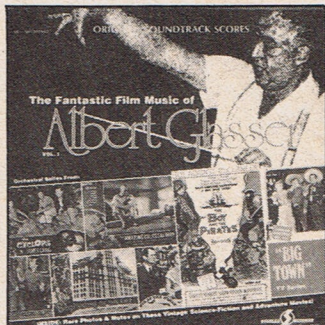
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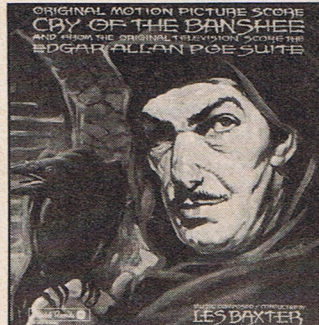
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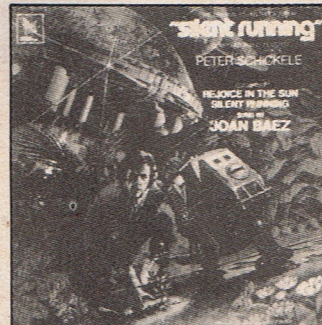
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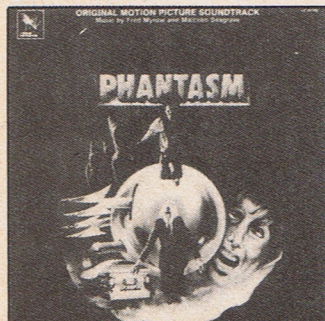
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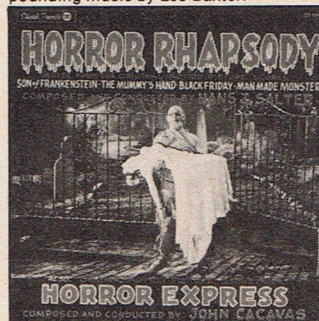
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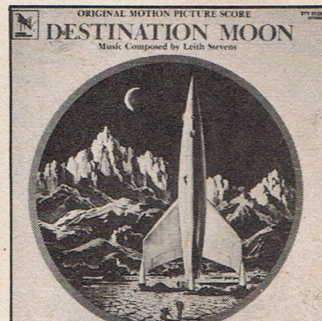
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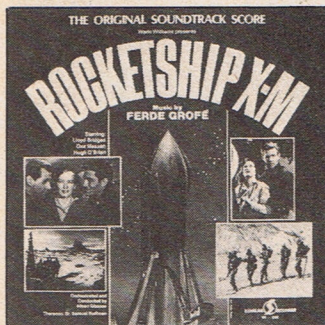
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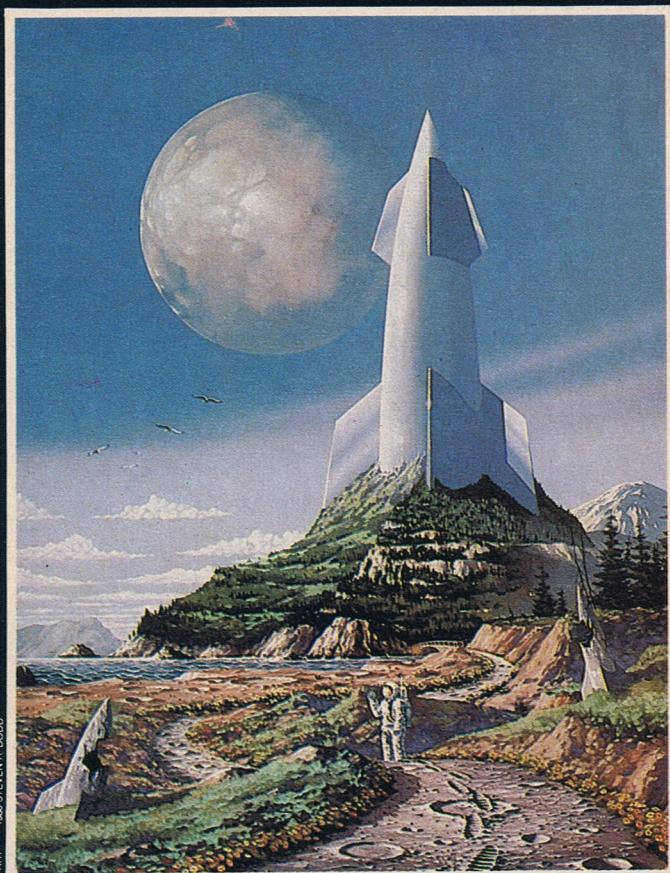
# Steve R. Dodd

Steve R. Dodd has been interested in space art all his life. "I have drawn ever since I can remember," states the 28-year-old artist. "At an early age I was inspired by the work of Chesley Bonestell, and was captivated by anything to do with space. I still have a drawing I did when I was five years old of a space scene depicting Saturn in the background with rockets and comets in the foreground." He smiles. "I now have it framed on my studio wall."

Through high school, his inclination toward outer space artistry remained largely dormant, until he received an important gift on his 18th birthday. "My sister gave me a copy of *2001: A Space Odyssey*," Steve recalls, "and this book revived my interest in space. After that I read all Arthur Clarke's books, along with Isaac Asimov's, and then saw the movie *2001*, which inspired me to start drawing space scenes."

At Memphis State University Steve began studying graphic design. However, he eventually changed his major to fine arts, "because it allowed more creative freedom. I didn't start painting until I was in my second year of college, but I haven't stopped since."

From his studio in the small west Tennessee town of Parsons,



the prolific artist has already completed about 200 large paintings and "hundreds of watercolors, color pencil drawings, etchings, silverpoint, etc., and dozens of smaller paintings. I also enjoy painting 'traditional' earthscapes and seascapes."

The two pieces of work featured in this issue's Gallery are hardly traditional. Of "The Astronaut," on this page, he says,

"It is sort of a romantic's-eye-view of an astronaut entering his space ship."

He has more to say about "An Alien Port," the centerfold painting. "This is one of my first paintings depicting my brand of alien technology," Steve explains. "I don't visualize aliens as tentacled three-eyed monsters shooting laser guns and what-have-you, but rather as highly

technical beings bordering on magical—and mysterious. You will most probably never see an actual alien in my paintings, only their products, because to show them destroys the effect of 'I wonder what they would look like?' and therefore the magic of the picture is hindered. This is just one of the ways I visualize an advanced alien technology."

"Although I love to paint spacescapes," Steve admits, "I will be concentrating more in the future on my fantasy scenes and the super-technological type scenes such as 'An Alien Port.' The typical spacescape, such as those depicting a planet from one of its satellites, has become less of a challenge to me, and also doesn't allow me to express my own ideas as well. I have hundreds of ideas in the form of rough sketches that I hope to paint someday, ranging from fantasy to technological, and from humorous to sinister."

The appearance of his paintings in *FUTURE LIFE* marks Steve Dodd's publishing debut. He explains this as being due to two circumstances: "I was waiting for the right opportunity which best suited me, and I wanted my work to be what I consider of publishing quality before being viewed by the general public." Obviously, the quality is now there—in large quantities. F





# PROSPECTING IN THE SOLAR SYSTEM

Earth's resources are waning,  
but infinite untapped riches  
lie just beyond the biosphere

By STEWART NOZETTE

In recent years we have all been exposed to gloomy scenarios for our collective futures. Most of these scenarios center around the idea of resource depletion combined with world population growth. In such a future world some see an overabundant population involved in fierce competition for underabundant natural resources.

Such ideas completely neglect a basic although subtle change in the capabilities and reach of the human race. In the past 23 years we have witnessed the first faltering steps into the solar system. Our world does not exist alone, isolated in space, and we are not confined to its limited stock of resources. We have already begun our first reconnaissance of the solar system. We know what's out there. The Moon and planets are no longer mysterious discs of light moving through the night sky but rather places, landscapes and new territory. We have sent robot spacecraft to all the planets known to the ancients.

The future of human civilization does not rest on the resources of Earth alone. We may reach out to the newly explored worlds of the solar system: the Moon, the planets and the asteroids. They will provide untold wealth for our future generations and guarantee a richer and more comfortable existence for the majority of people on the globe. We may envision a future of promise, with dreams of greatness for a civilization no longer confined by the restrictions of one planet.

These are wonderful ideas. But are they based in fact? What is out there and how may we convert the potential into cold cash?

Of all the places in the solar system which might provide resources for future generations, the Moon must rank first on a list of potential candidates. We have visited the Moon and returned samples from nine places on its surface. Six Apollo missions have returned almost 850 pounds of rock and three Soviet robots have returned several ounces more.

Extensive studies of these returned samples conducted by scientists for the past decade reveal the Moon to be, by terrestrial standards, a very poor ore body. The dark features of the Moon which make up the face of the so-called "Man in the Moon" are called the Mare or Seas. Studies of rocks returned from these areas reveal them to be vast plains of lava which poured out of the interior of the Moon and cooled over three billion years ago. These lavas are called mare basalts and are rich in iron, silicon, magnesium, titanium and oxygen. All the metals are bound up with silicon and oxygen in minerals. The lighter parts of the Moon are known as the Lunar

In the not-too-distant future, Earth mining expeditions will begin prospecting the moons of Jupiter for valuable resources.



ART: © 1980 JAMES A. BRYANT



Highlands. These areas are rich in calcium and aluminum, again bound up with silicon and oxygen. The Moon, however, lacks many of the processes which create and concentrate ores on Earth. The Moon's main advantage as a resource lies in its lack of atmosphere, low gravity, proximity and known composition.

It would require about 1/20th of the Earth launch energy to remove rock from the Moon and transport it to a processing plant in near-Earth space. One must always keep in mind that in space, distance is not the important factor in travel that it is on Earth. On Earth we must fight gravity and air resistance for the entire trip. In space, difficulty of travel is measured by how much one must change velocity to arrive at a certain point. This translates directly into pounds of rocket fuel used during the trip. The lower gravity on the Moon combined with the lack of air resistance make the Moon a good source of raw materials for future space industry. It is doubtful, however, that lunar material could compete directly with terrestrial resources in the terrestrial market, with the possible exception of titanium (more on this later).

Building plants in space to convert lunar resources into useful metals and oxygen will be a difficult engineering task. Preliminary studies of suitable chemical processes are already under way. The minerals of the highlands may be processed to extract aluminum, oxygen and silicon. In addition, glasses and ceramic materials may be easily manufactured from lunar rocks. All of these materials may be used in space construction and manufacturing.

The lunar soil also contains about one percent by weight of pure iron in the form of small grains. It may be possible to separate this iron magnetically. One could conceivably obtain a great deal of pure iron by processing enough lunar soil. The Mare regions contain a great deal of titanium in the form of the mineral ilmenite. This mineral is also slightly magnetic and could be separated with the iron metal.

Titanium is one substance which may be plentiful enough on the Moon to allow profitable export to Earth. This metal is used in all modern high speed aircraft, and will probably be in short supply in the 21st century. A large part of the world reserve of this vital strategic metal lies within the U.S.S.R. In addition, the high flux of solar energy, vacuum and weightlessness in space provide ideal conditions for processing and fabrication of titanium. The expense of obtaining some of these conditions on Earth lend greatly to the expense and difficulty in working with titanium. Titanium with its light weight and resistance to high temperature make it ideal for all types of aerospace-related applications. One may even envision a future space-based aircraft and spacecraft industry springing up to take advantage of lunar titanium. The processed metal could even be fabricated into aerodynamic lifting bodies to return manufactured goods to Earth.

The Moon may be our first stop but its usefulness may prove limited. There are



Perhaps the most accessible source of raw materials lies in the Earth-approaching asteroids. Some are even easier to reach than the Moon—and much easier to leave.

many things which the Moon cannot supply. It is almost completely devoid of water, carbon and nitrogen. And it is poor in many materials which will be in short supply on Earth, or are distributed unevenly. These include nickel, chromium, manganese and cobalt.

The asteroids appear to be the richest extraterrestrial source of raw materials. You have probably visited your local natural history museum and seen a large iron-nickel meteorite. That huge hunk of metal was probably part of a small asteroid shattered millions of years ago during a collision. Some

of the pieces eventually intercepted the Earth and ended up in our museums. In fact, scientists believe that most of the meteorites we see today on Earth originated on these small bodies. Some may have been shattered by primeval collisions, with the pieces delivered to us free of charge.

The asteroids may be grouped into two major classes, based on location in the solar system. There are the mainbelt asteroids located between Mars and Jupiter, and the Earth approaching asteroids. The Earth approaching asteroids may be divided into two groups, the Apollo and Amor asteroids. The

Apollo objects cross the orbit of Earth and the Amor objects travel past the orbit of Mars. The Apollo and Amor asteroids are the most accessible group of objects in the solar system. Some are even easier to reach than the Moon.

Some two dozen Earth approaching asteroids have been discovered, and scientists believe that thousands of small objects—less than one kilometer wide—have yet to be located. During the past decade, planetary scientists have made great strides in understanding the asteroids. Telescopes have been equipped with sensitive light measuring devices which enable scientists to measure the color of asteroids. This allows estimates to be made of their composition. Comparisons may also be made with samples from our meteorite collections. Results of this work indicate that a large majority of the asteroids may be made up of the same materials as a

asteroids will be covered by blankets of loose soil called regolith. It may be possible to send robot collecting devices to scoop up material and return it to space processing facilities. In fact, the late 1980s could see the first visit to an Earth approaching asteroid. These missions could be accomplished with one or two shuttle launches.

Recent oil shortages have dramatically demonstrated the interdependence of civilization and raw materials. We will face shortages in the future not only of oil but of many vital metals as well. It is easy to imagine an OPEC-type group controlling nickel, chromium, cobalt or titanium. If space transportation becomes cheap enough, the wealth contained in the Earth approaching asteroids may just provide the incentive to expand space industrialization.

As we move into the outer solar system the types of materials available change

**The solar system provides riches beyond any terrestrial comparison. There are so many sources of materials that conflict will probably be less profitable than just chasing another asteroid.**


group of meteorites known as carbonaceous chondrites. These meteorites are rich in water and other elements not found on the Moon. One small carbonaceous asteroid could make future space industry completely independent of Earth for water. Water may be converted into oxygen for breathing and hydrogen for rocket fuel. Chemical processing of carbonaceous asteroids may prove much easier than the processing of lunar materials.

Other Earth approaching asteroids are probably rich in metal. Unlike the Moon, which contains little free metal, some asteroids may be pure iron nickel alloy, or even contain small amounts of trace metals such as cobalt and platinum. There are probably thousands of these objects and they could provide raw materials for thousands of years of industrial growth. The exploitation of Earth approaching asteroids will certainly do little harm to the overall integrity of the solar system, since most of these objects will probably collide with the inner planets on time scales as short as one hundred million years—short when compared with the four and one half billion year age of the solar system.

The asteroids are a rich, practically inexhaustible source of raw materials. Many schemes have been suggested for retrieval of these bodies. The most attractive schemes use the energy of sunlight, and part of the asteroid itself as reaction mass, to propel the asteroid into near Earth space. Recent studies also suggest that small carbonaceous

dramatically. Instead of rocky objects we find whole planets composed of ice. Two of the four largest satellites of Jupiter appear to be composed almost entirely of ice. Such worlds could serve as supply outposts for the deep space missions of the future. If one desired to brave the hostile radiation environment near Jupiter, the second innermost satellite, Io, could be the sulfur mine of the solar system.

The solar system provides riches beyond any terrestrial comparison. All that is required is the will to begin the exploitation. Non-terrestrial resources provide one further advantage: they contain no living things. Thus we do not have to destroy the natural habitats of any living creatures in pursuit of these riches. And there are so many sources of materials that conflict would probably be less profitable than just chasing a different asteroid.

The greatest problem in acquiring these extraterrestrial riches lies not in science and engineering but in politics and psychology. Acceptance of the idea that the human race must no longer depend on the Earth as its sole means of support is very new and difficult for people to accept. In the end it may never be accepted by those born before the first ventures into space. The true pioneers will be members of the generation which has grown up with space exploration and view it as a normal extension of human influence. The efforts of these pioneers will insure the survival of humanity and result in the development of a new galactic civilization. 

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# BRIAN ALDISS

Perhaps the most esteemed British science fiction writer of this generation, Brian Aldiss has amassed impressive credentials as a first rate writer of fiction and nonfiction, as well as poetry and literary criticism. His laurels include the prestigious Hugo Award in 1962 for *Hothouse* and the prized Nebula Award in 1965 for *The Saliva Tree*. He was selected as Britain's most popular SF writer by the British Science Fiction Association in 1969, and received the coveted Ditmar Award as the best science fiction writer of 1970.

Brian Aldiss was born in the market town of East Dereham, near Norfolk, England, in 1925. The son of a shopkeeper, Aldiss, who had little interest in such things, was sent away to boarding school at age eight, where he remained until he was 17 years old. He attended the West Buckland School and Farnham College, then served in the British Army for four years, including service with the Royal Corps of Signals, attached to the Indian Army, for which he received the Burma Star.

During those early years away from home, Aldiss developed a keen interest in reading and writing, particularly science fiction, and tried his hand at writing ghost, detective and space stories. Released from the Army in 1948, Aldiss decided to pursue his primary interest, which was to be a writer—more specifically, a poet. He took a job in a local bookstore in Oxford, where he spent much of his time reading and polishing his skills as a writer. His interest in books and bookstores led him to write a series of discourses about an imaginary bookstore, later collected and published in 1955 under the title *The Brightfount Diaries*, a social comedy written in dialogue form. Aldiss's first published science fiction story was "Criminal Record," which appeared in *Science Fantasy* in 1954.

Around this time, Aldiss gave up his desire to be a poet and turned his attention to fiction. In 1957, he published a collection of short stories, titled *Space, Time and Nathaniel*. Since then, he has gone on to produce hundreds of novels, stories, anthologies and reviews. In addition to the above mentioned works, Aldiss has written such popular volumes as *Non-Stop*, *Galaxies Like Grains of Sand*, *Greybeard*, *The Dark Light Years*, *Cryptozoic*, *Report on Probability A*, *The Shape of Further Things*, *Frankenstein Unbound*, *Hell's Cartographers* and *The Malacia Tapestry*. Furthermore, he has authored a definitive history of science fiction, *Billion Year Spree*; co-edited with Harry Harrison the highly successful *Year's Best Science Fiction*; and edited an impressive volume of illustration, *Science Fiction Art*.

To what extent is Brian Aldiss knowable through his fiction?

You can know me well through my books—that is to say, through my fiction which, over a quarter of a century, presents something of my moral development (much of it is about development, moral and

artistic); and you can supplement the fiction with such non-fiction as *Billion Year Spree*, which presents a clear picture of my involvements, and *Shape of Further Things*, which is directly about my life. There's also my memoir in *Hell's Cartographers*.

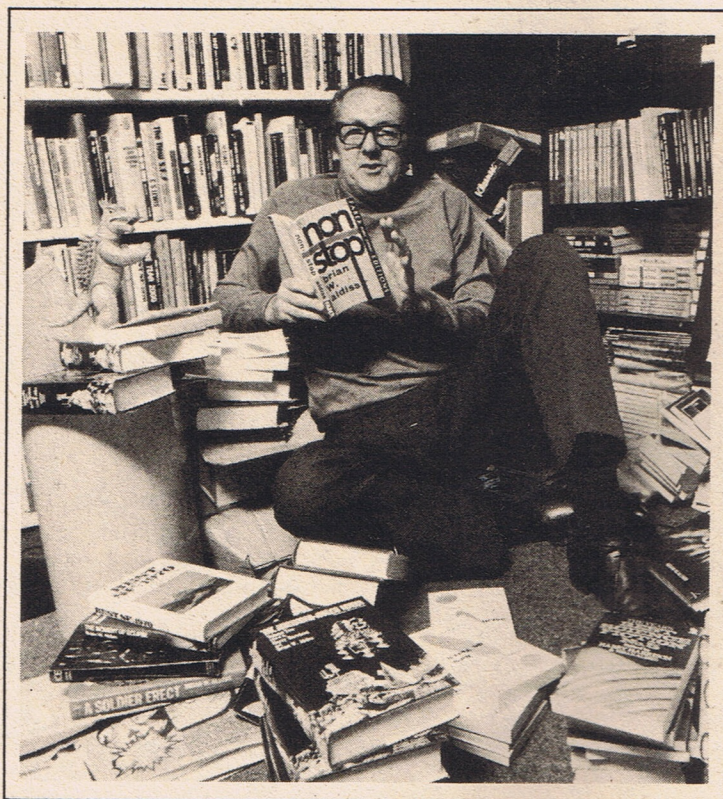
Some observers have described you as an extremely enigmatic writer—one who is unpredictable in terms of both content and style. Do you view yourself that way?

True, I range widely in content and style. That's a reflection of my diverse personality and interests. But I am a direct person in reality, though that's not to say I give everything away to everybody. Much more enigmatic are those writers who forge along, content with the old pulp-popular style of writing. It's a

uniform, revealing nothing of themselves, conveying nothing, just conformity.

Would you agree with those who contend that your writing is characterized by a deep sense of alienation?

A deep sense of alienation? I can convey alienation and dread as well as the next man. *Report on Probability A* (soon back in print from Avon) is a triumph of alienation, I suppose. And one of my themes is the increasing anomie of modern man. But I hardly regard myself as "modern man" in that sense; having the fortune until lately to live in the country—and now to live in one of the world's great civilized towns—I often reflect in my novels a love of and identity with the landscape. However, readers always extract from



A veteran SF writer reviews his two decades in the genre.

novels what they need to find; that's as it should be.

To what extent does "message" figure into your motivations for writing?

Do you remember the last chorus in my space opera, *Eighty Minute Hour*, where the characters sing:

"Think! Think!—Whatever your brain,  
Lecherous, treacherous, loving, or vain,  
Think! Take us with you wherever you  
wend,  
Else our Hour of Existence is now at an  
end,

So think, think, think, again!"

I do hope to provoke readers into thinking, rather than sedating them, because thought seems to me pleasurable. It's an attitude you find even in an early entertainment like *Hothouse (Long Afternoon of Earth)*. It's always difficult to determine what people mean by "message"; sometimes they are trying to designate "meaning." A work should obviously have meaning. I believe that *Dark Light Years* has a message also, but it is not signalled on every page; it is delivered once explicitly, by Mrs. Warhoon, but the other characters reject it violently, because it's that sort of message. However, in my more recent *Enemies of the System*, I did allow the political message to become more explicit.

What about science fiction makes it a good genre for you to work in?

When I first entered the science fiction field, I saw, arrogantly, how full of bad writers it was, guys who couldn't put one word on top of another; so I thought it would be easy to make a name by writing decently. Well, that was long ago. It has been a tremendous privilege to be writing science fiction over the last 20 years and to see it—help it—expand in all directions, and to be able to contribute criticism as well as fiction. Science fiction is gloriously flexible, and I still have a sense of it as a largely unexplored land.

To what extent does the mission of science fiction, as you conceive it, shape the scope and direction of your work?

I'm seized by the direction of my own fiction, excited by it, optimistic about what I may be able to do next—always something fresh, I hope. That shapes me more than outside influences. But before I wrote for publication, intense reading of science fiction certainly shaped me. In particular the editorial work of John W. Campbell; I owe a lot to his preaching of independence of mind, and have cultivated that virtue—sometimes to the annoyance of the Campbell school!

Throughout your writing there is the constant theme of change. How do you see the concept of change? How do you try to picture it in your writing?

We live in the middle of an explosion. The Big Bang is still going on. Our bodies are composed of star matter, and the initial disruption forms part of our every breath. Maybe that's what the Church means by Original Sin. So nothing is static. Science fiction helps us to see ourselves as creatures of flux, within flux.

Do you write your books consciously on more than one level?

Novels are multi-dimensional. They are metaphors for life. Do you imagine, when I wrote my first science fiction novel *Non-Stop* (also known as *Starship*) that I was not aware of that great imprisoning ship as a metaphor for many kinds of imprisoning human conditions? Happily, my readers have taken it as such, despite its shortcomings.

Do you write with the specific intent of communicating with the reader, or do you write with yourself in mind as the audience?

It's hard to say. I'm generally absorbed in telling the story. That's the target. This process is presumably addressed to one's higher self, the subconscious shaping something to offer to the super ego, or words to that effect. But of course you occasionally stand back

“... When I first entered the science fiction field, I saw, arrogantly, how full of bad writers it was. I thought it would be easy to make a living by writing decently.”

and think, "That'll shock 'em"—or make 'em laugh, or whatever. Writers concede too much to editors and readers; I try not to condescend.

How conscious are you of technique as you write? Do you do considerable rewriting before getting the language just right?

I'm a careless writer. I have to correct all I write. Often the redrafting of novels is extremely satisfying: one sees exactly what's going on, and so second and third drafts—*Malacia* had four—produce renewed bursts of creativity. The result is a greater depth of vision. A writer has only his technique between him and silence. However, technique is properly employed instinctively; you don't think about it when composing, any more than you think of the individual strokes while swimming. Of course, certain types of story may need particular stylistic devices; whilst writing *The Masque of The Red Death*, you allow a certain pomp into the narrative to convey your surroundings. Perhaps it is worth adding that I regard my short stories as distinct from my novels, almost a separate art form; and in my stories I allow myself greater stylistic freedom than in my novels, often deploying devices to tease myself or my reader.

Do you feel more comfortable working in one literary genre as opposed to another?

Comedy is difficult to write in science fiction. In ordinary fiction, it's easier. The black comedy in my Stubbs novels relies on the familiar seen through a distorting lens. That can't be done in science fiction, though one can use other forms of comedy. I have to report that my best-sellers earned a better quality of attention, I think, than my science fiction novels. Perhaps that situation is changing; one of the most impressive developments of the '70s has been the exponential expansion of science fiction teaching and criticism. Ultimately, that expansion works to everyone's benefit.

How concerned are you with language—word choice, word sound, word nuance—in the development of a story?

Word choice, word sound, word nuance—without these, there is no story. A very elementary observation. You've got nothing but words; they are what you have chosen to work with, instead of oils, acrylic, stone, music, film or whatever. Sometimes I think stone might be easier. My early stories were constructed in my head, without the aid of paper until a late stage. I would then often concentrate on a phrase, on phrases, on paragraphs, getting them right. An example is a sentence in the story "Poor Little Warrior": "Bang-bang the dum-dums, big as paw-paws, go." But if you get too flashy words contend with meaning. I believe I have carried such mad music as far as I wish to go; after *Barefoot in the Head*, it's been downhill all the way—towards meaning.

You often employ humor to great advantage in your writing. What role does it serve as a story device? Moreover, many of your novels also reveal considerable satire, particularly British satire. Is satirization a literary objective?

Humor and satire are part of my approach to life. They're ways of opening up the oyster. Hence my admiration for the great comic writers of science fiction: Harrison, Sheckley, Sladek. Also, the best writer of us all, Philip K. Dick, who uses his wit so admirably to penetrate to the heart of the matter. Satire and irony are ambivalent tools, useful to a writer. Supposing I say, "After all, wet-backs are just Spanish-speaking tourists who have lost their way," I convey several levels of comment, directed against illegal immigrants, the immigration laws, the need of the Carter administration to be nice to Mexico, and the non-satirical use of such euphemistic language by others. So it's an allusive way of speaking, and illusive, too; it needs to be used sparingly.

Can you say something about your concept of an "alien"? How and why do you picture aliens the way you do?

The science fiction field ought always to be really outrageous. Instead, it is full of orthodoxies. We are all supposed to believe that FTL and telepathy are possible developments. Finding such assumptions a bit too easy, I attempt not to use them, except per-

haps satirically. Just recently, I've discovered to my horror that I don't really believe in aliens either. If this got around, I'd be drummed out of the regiment! Okay, I like reading about aliens, but should I allow myself to write about something in which I place no credence? Isn't that a bit of a confidence trick? As far as we know, mankind has always believed in external entities—demons, gods, ghosts, spirits, whatever—yet we have no evidence that they exist. I'd like to think that God existed. In fact, I spend a good deal of my time thinking about God. But my considered opinion is that he and the rest of the supernatural are nothing but manifestations of human biology, of the divisions between cerebrum, cerebellum, and the curious tripartite nervous systems of the body. Aliens and little green men probably belong in that same compartment, among the creaking floorboards of the mind. We're going to find the galaxy empty if we ever get that far—empty, or stuffed with migratory mosses incapable of sustaining intellectual rapport. Suits me. The human game is so interesting that it needs no additional accessories to hold our attention. Football is a great game; it is not improved by having half-a-dozen balls in play instead of one. Something else about aliens. I probably rank as one of the most travelled science fiction writers. I am happy in foreign places and with foreign people. The world's my home. Yet I see in some people a *foreignness* more complex than anything disguised with tentacles and green slime which I've come across in the pages of science fiction. There's such a terrific reservoir of mystery here on our home planet that the galaxy with its boring blank immensities looks tame by comparison.

*You often employ symbolism as a means of making a point. What value does allegory serve in your fiction?*

Metaphor I've already mentioned. Science fiction is a kind of symbolist literature. In most science fiction—not all—the future is just a metaphor for the present, the city a symbol for urban man. In *Malacia Tapestry*, I didn't want to write fantasy, since I don't much care for fantasy for its own sake, although I felt I had a beautiful, mysterious world to display. So I fortified myself by using the curse of non-change which has descended upon Malacia as an allegory for the dread of change which I diagnose in my fellow countrymen.

*Do you see your writing as "underdog fiction"—namely, writing which identifies with the plight of the oppressed?*

Coincidence. Serendipity. Just today I was writing a long letter to the English philosopher, Stan Gooch, author of *Total Man*. We were talking about the obscure functioning of the cerebellum, which has taken a back seat, almost literally, to the cerebrum, and suddenly I perceived it, the cerebellum, as a kind of underdog within us. And I identified it with the kind of fiction I write. Time and dreams are mysteries apprehended by the cerebellum. I saw that my fiction is concerned, in more senses than the

ordinary one, with the underdog. (This may or may not be a true perception; time will tell. But the synchronicity of your question, expecting the answer "yes," suggests that it is true.)

*How do you try to picture the future in your fiction? As you view it, what is the relationship between past and future?*

It's impossible to answer this question in general terms. Every problem demands a slightly different approach to the future. In *Galaxies Like Grains of Sand*, I did try to carry through a consistent approach to history in a story of mankind to the end of the galaxy; whereas in *Enemies of the System* I had to use future expanses of time rather extravagantly, just to bring home a present truth as I saw it. The relationships between

“... **M**y belief is that science, religion, art, spring from the same creative center. They must strive together like rival siblings, but siblings they are. Science is over-used in SF, to the exclusion of art.”

past and future are complex, as are the relationships within any going marriage.

*Is death a pronounced theme in your writing? How do you try to portray its meaning?*

Death is the pale underbelly of Time. Much science fiction advances with placatory intent, saying, in effect, "Things may be bad but we'll survive." I don't consider myself in the consolation business. Readers are tough or why aren't they sitting watching the Osmonds on TV? Use of death and alienation, Nature's pre-cooling system, serves to convey a proper sense of unease. Put it another way: Any literature that aspires to being more than pabulum must deal with the great Inconstant Constants like Love, Death, Life, Awareness, etc.

*Your writing has sometimes been characterized as "confession fiction"—that is, writing predicated and rooted in self-disclosure. How much confessing do you do in your work?*

Rather easy assumptions lie behind your question. Confession is a complex art. I don't believe that I go in for self-disclosure; conversely, I often have my characters espouse ideas I dislike, simply because they're that sort of person. But a reader can amuse

himself by reading what he likes into the fiction he reads. There's no law against it. Often you sweep into novel material lying around on the surface of everyday life. The children playing in the sand at the beginning of *Frankenstein Unbound* actually happened; the novel was all planned, but as I sat down to write in our courtyard, there were the innocent children, pretending there was such a thing as death, and I couldn't resist putting them in, quite undesigningly. They improve the book.

*Given your facility with words, do you ever find them a hindrance in attempting to convey deep emotion or pronounced experience?*

The hindrance is in myself. No good blaming the damned words.

*Do you aim at presenting your reader with a metaphysical view of human personality?*

Yes. We must believe we can improve—improve ourselves and our lot. Then we will improve.

*To what extent do literature and art figure into your work as major influences?*

My belief is that science, religion, art, spring from the same creative center. They must strive together like rival siblings, but siblings they are. Science is over-used in science fiction, to the exclusion of art (though religion always rumbles like thunder in the background). So I often use art, invented art or the work of real artists, as fulcrums in my stories. Obvious examples are the *scherzi* of Tiepolo in *Malacia*, or *Frankenstein in Frankenstein Unbound*.

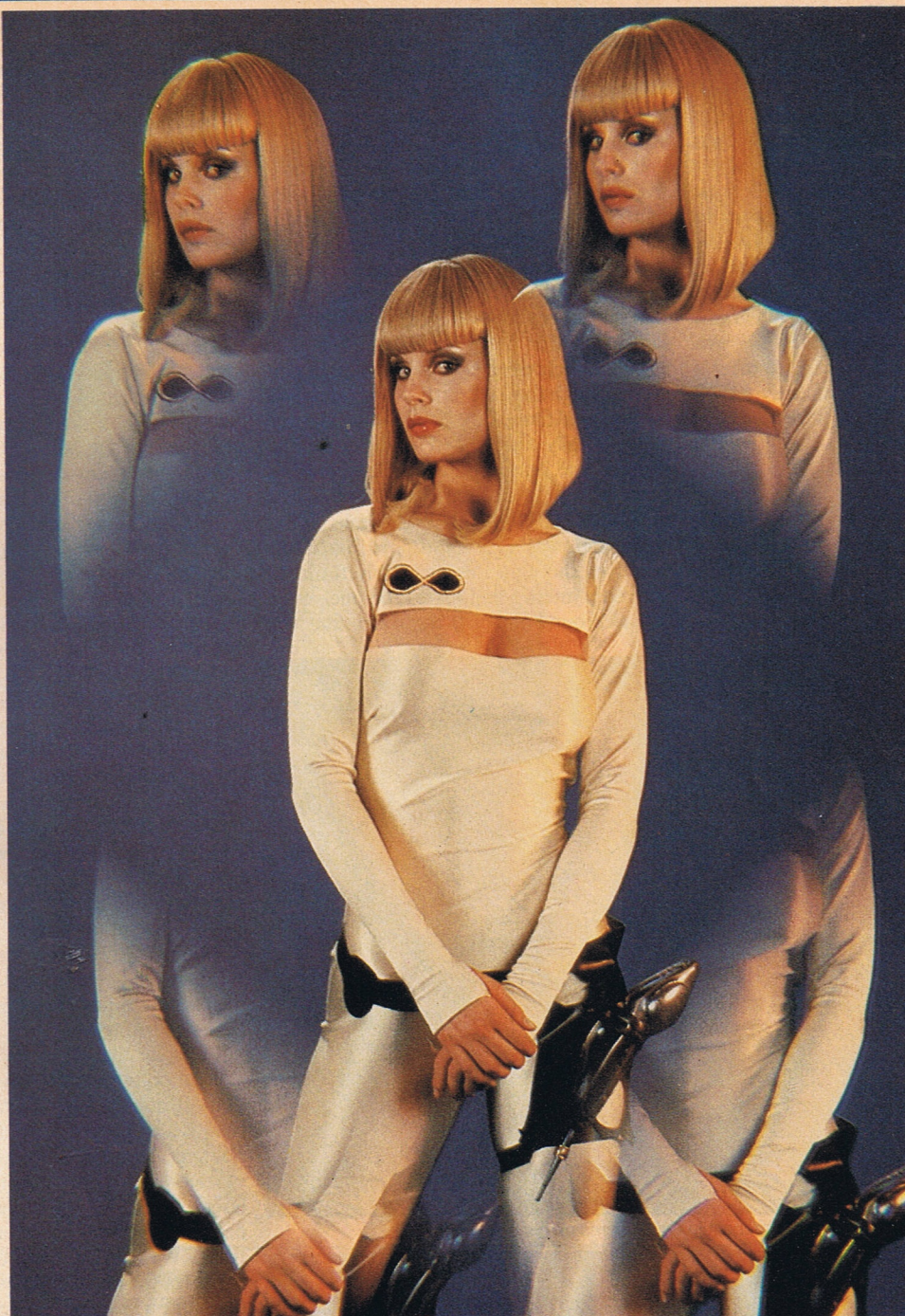
*Many of your stories feature artists and writers as heroic figures. What makes them such? How do you try to convey this in your writing?*

As part of the process, artists naturally become involved as figures. Bush in *Cryptozoic*, Mary Shelley in *Frankenstein Unbound* and, with the best effect, Fatember in *Malacia*. I see the artist as tough, enduring, perceptive, but non-aggressive, non-exploitive. I dislike aggressive heroes. Perhaps in this way my fiction differs most from run-of-the-mill sky-fie. I hate the jackboot philosophy which leads to war. Remember, I was involved for three years in a real tough war, so I don't need to glamorize the process in my novels. Artists just fight one-man wars.

*Much of your writing reveals a deep love of poetry. Do you write much poetry? How does it enhance your work? Does it fulfill a need for self-expression?*

Once upon a time, I had an ambition to be a poet. I regarded poetry with undue reverence. Actually, the damned thing's like a weed. I'm trying to stamp it out. *Report on Probability A* was an attempt to stamp out adjectives and poetry—successful, but they keep coming back. Perhaps it's the influence of landscape. The Romantics had similar deep feelings for landscape, a sensuous response to contour, etc, etc. I wrote a travel book on Yugoslavia, *Cities and Stones*, spending half a year there, just driving

(continued on page 67)



# COSMIC CHEESECAKE

Galaxina mixes healthy doses of satire, slapstick  
and sensuality in its recipe for re-fried science fiction.

By ED NAHA

"This is a very bizarre film," chuckles writer/director William Sachs during the final days of production on his forthcoming SF film *Galaxina*. "It's a movie that is...different...in many ways." His soft chuckle erupts, at that point, into a gale force gust of laughter.

Sachs, a transplanted New Yorker now residing in Los Angeles, is best known in science fiction and horror film circles as the man behind the low-budget thriller *The Incredible Melting Man*; a celluloid opus that did much to advance the cause of Clearasil. While this previous genre offering was calculated to chill, it did manage to offer a goodly amount of intentionally droll dialogue. This time around, Sachs is abandoning the poker-face approach and pulling out all the satirical stops.

"*Galaxina* is a spoof of a certain type of science fiction-film," he reveals. "In my opinion, there are two types of science fiction: the currently popular hardware-oriented type and the more thoughtful Ray Bradbury, Harlan Ellison strain. We're spoofing the

swashbuckling pop science fiction film."

Briefly, the plot of *Galaxina* concerns the efforts of space patrolmen Thor (Stephen Macht), Buzz (James David Hinton) and daffy Captain Butt (Avery Schreiber) in their attempts at snatching the "Blue Star," a gem that possesses an unlimited power supply, from the planet Altar 1. Onboard their patrolship is dazzling robot *Galaxina* (Dorothy R. Stratten); a well-endowed android who keeps the ship's engines running smoothly and Thor's blood running, period.

"The movie was goofy from start to finish," says its creator. "All the actors loved their roles and Schreiber kept everyone laughing even through the darkest of hours...and we had quite a few of them, literally. The sun almost totally disappeared during our shooting schedule. Most of our problems resulted from last spring's torrential rainstorms here in California. We had a lot of leaks in our studio and the rain never stopped. We'd find ourselves shooting this incredibly futuristic spaceship interior and there'd be buckets lying all around catching the water that was

dripping out of the ceiling.

"We also had quite a hard time casting *Galaxina*. I mean, we were looking for a really unusual, beautiful woman. It's hard to find a beautiful woman in Los Angeles. Really. After a while they all start to look alike. Dorothy walked into our office and the response was immediate. Everyone just stopped working. She's amazing. In heels, she's over six feet tall. She's incredibly statuesque. We would have cast her even if she wasn't named *Playboy's* Playmate of the Year."

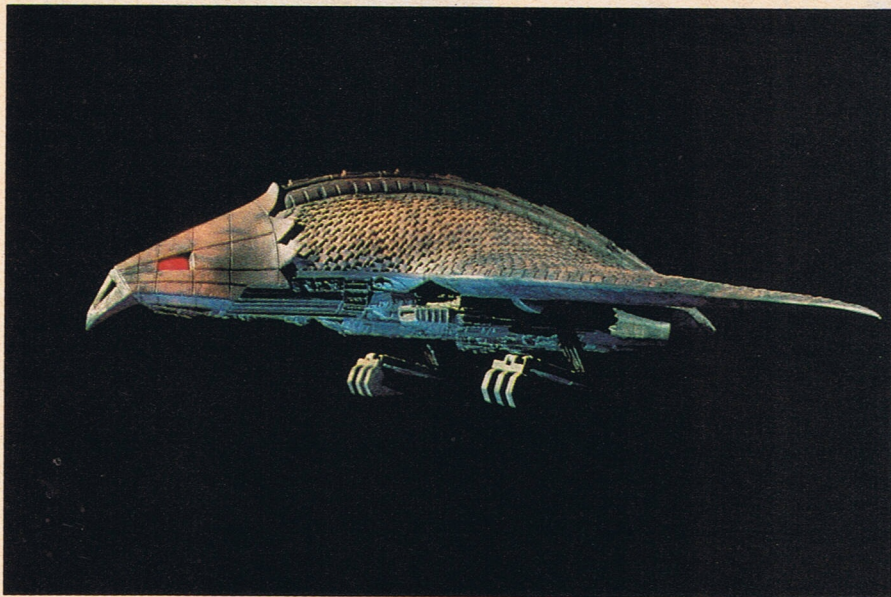
Despite the film's overtly lighthearted slant, the filmmaker did manage to introduce a few new technological wrinkles of a serious nature. "We've done something no one has really ever done before," says Sachs. "We shot a few scenes in infrared *Echtachrome*. It's a strange sort of film that's heat sensitive. It was used in one scene in *Apocalypse Now* during a nighttime jungle explosion. It's mostly used by the U.S. government for night aerial missions. The film sees through the darkness and picks up the heat emitted by the foliage in the night. It gives it a strange color on the finished film. We use it in our film when *Galaxina* and her crew land on a rainbow planet. We have a green sky, red foliage and yellow ground. We put special makeup on the actors so they'd look normal against this backdrop. The film was really tricky to use because it has to be frozen before you can touch it and then dethawed for a certain amount of time before you can load it into the camera. Making things even more difficult for us, the rain messed up our shooting schedule totally. We couldn't use the film on overcast days. During our entire 20 days of live action shooting I think we had three hours of strong sunlight.

"Despite the weather problems and our short shooting schedule, we still managed to pull off quite a few new twists, though. We have a new process that allows us to realize holography more successfully than most other movies on the screen. We have a new laser effect, too, where there's a secondary beam of a different hue emitted during the firing. We came up with over 100 different aliens for the production as well, not to mention quite a few new types of spaceships. Our villain's ship, for instance, is modeled to look like a gigantic bird of prey. Instead of feathers, it has armor plating and steel claws."

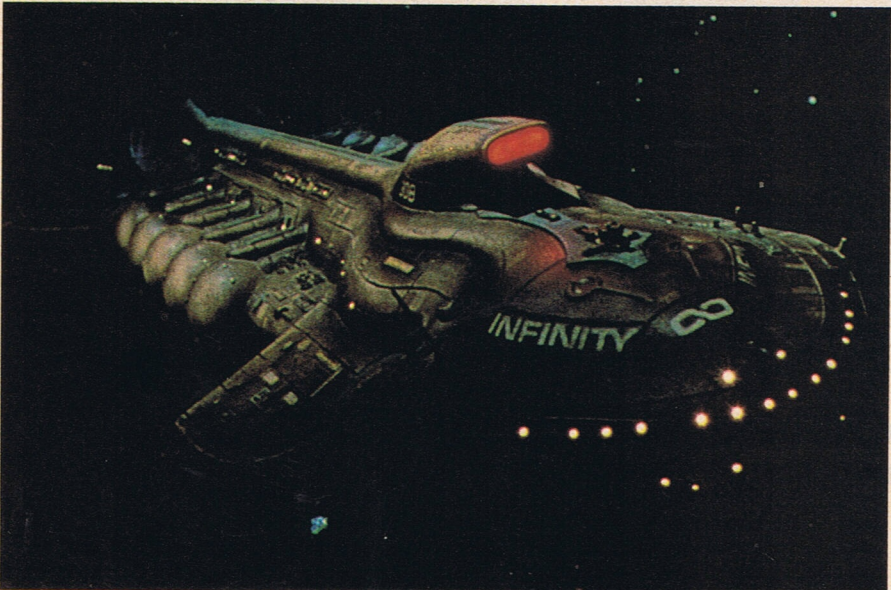
But it's the film's inherent nuttiness that Sachs hopes will impress movie-goers most.

"Our first scene sets the tone for the picture," he smiles. "There's a large asteroid floating in space with a billboard for 'Earth Cola' on it. On the other side of the asteroid-billboard is our police cruiser just waiting for a speeder. When one zips by, the police cruiser takes off. Buzz asks Thor, 'Can I put on the lights and use the siren?' Thor turns around and says, 'In space, no one can hear your siren.'"

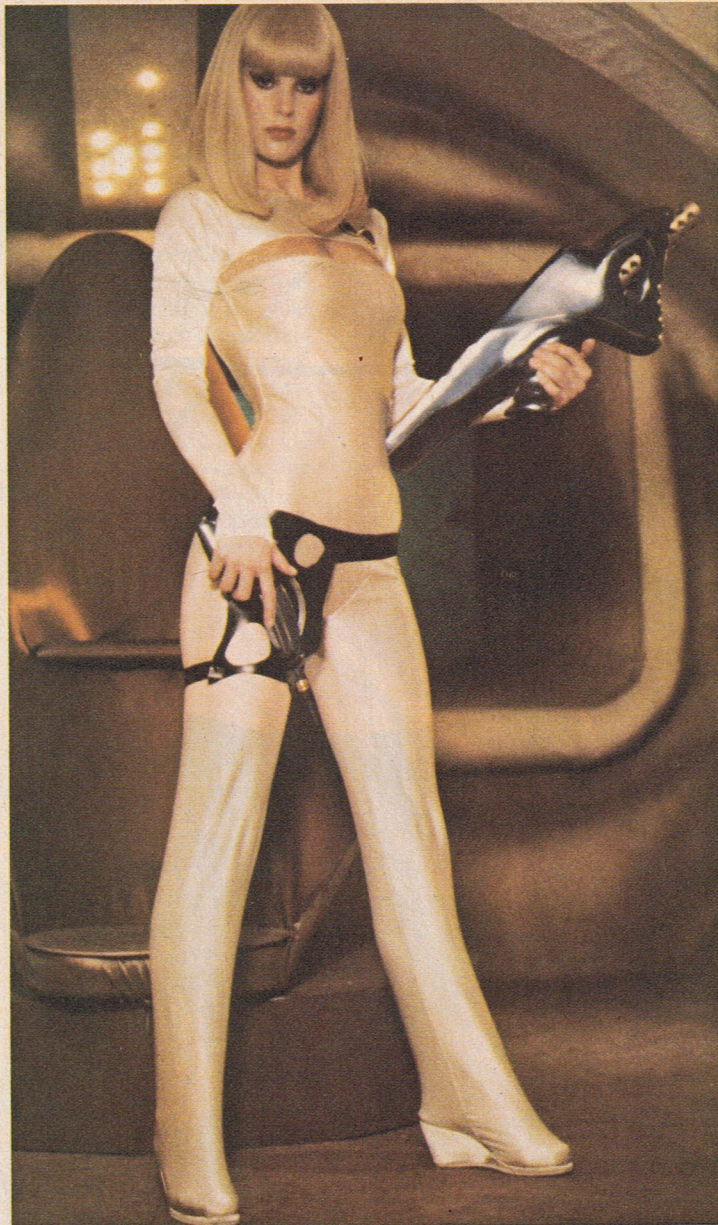
"We have a lot of strange little plot twists in this film. At one point, Thor and Buzz land on this planet where there's a 'Human Restaurant.' They figure, 'Great. They serve old fashioned human food here.' It turns out



Villainous Ordric (Ronald Knight) has a spaceship which sums up his personality.



Your local neighborhood police cruiser of the far flung future.



Left: The film's take-off on *Alien*'s chest-burster looks for its mama. Right: Galaxina displays her weaponry.

that the establishment is an alien restaurant where humans are served as the main course. In that scene we have a bartender who's an exact double of Mr. Spock. Our alien, though, is called Mr. Spot. He has beagle ears instead of pointed ones.

"We have a little *Alien* spoof, too. A takeoff on the chestburster. Aboard ship, the human crewmembers have to eat these little pills. There's no real food onboard. Anyhow, Captain Butt, this crazy man, finds an alien egg. It's been such a long time since he's encountered food that he eats it. Before long, his stomach starts pumping up and down. They punch him in the stomach and our version of the chest burster comes sailing out of his mouth.

"The little alien thinks Butt is its mother and follows him around the ship all the time. When the crew is in cryogenic sleep on their 27 year voyage to Altar 1, the alien finds Butt and opens his chamber prematurely. Butt is sleeping inside in a gold diaper. As the result

of the premature opening, by the time the ship lands on Altar 1, Butt is old and senile. He doesn't know what's going on. For the rest of the movie he thinks he's in Philadelphia and walks around trying to order a pizza.


"On Altar 1, Galaxina is captured by a group of space Bikers. The deal is this: In Earth history, Australia was settled by outcasts from British society; common criminals. It was a penal colony. Altar 1 was originally designed as an Earth penal colony and the first bunch of criminals sent up there were motorcycle thugs. Here we are a thousand years later with all these bikers' descendants running around not knowing why they dress the way they do. They don't even know what a motorcycle is! There is one Harley on the whole planet and they don't know what it's for. They genuflect in front of it and pray to it." Sachs pauses. "And then there's the intergalactic brothel called Kitty's that's populated by alien hookers and this

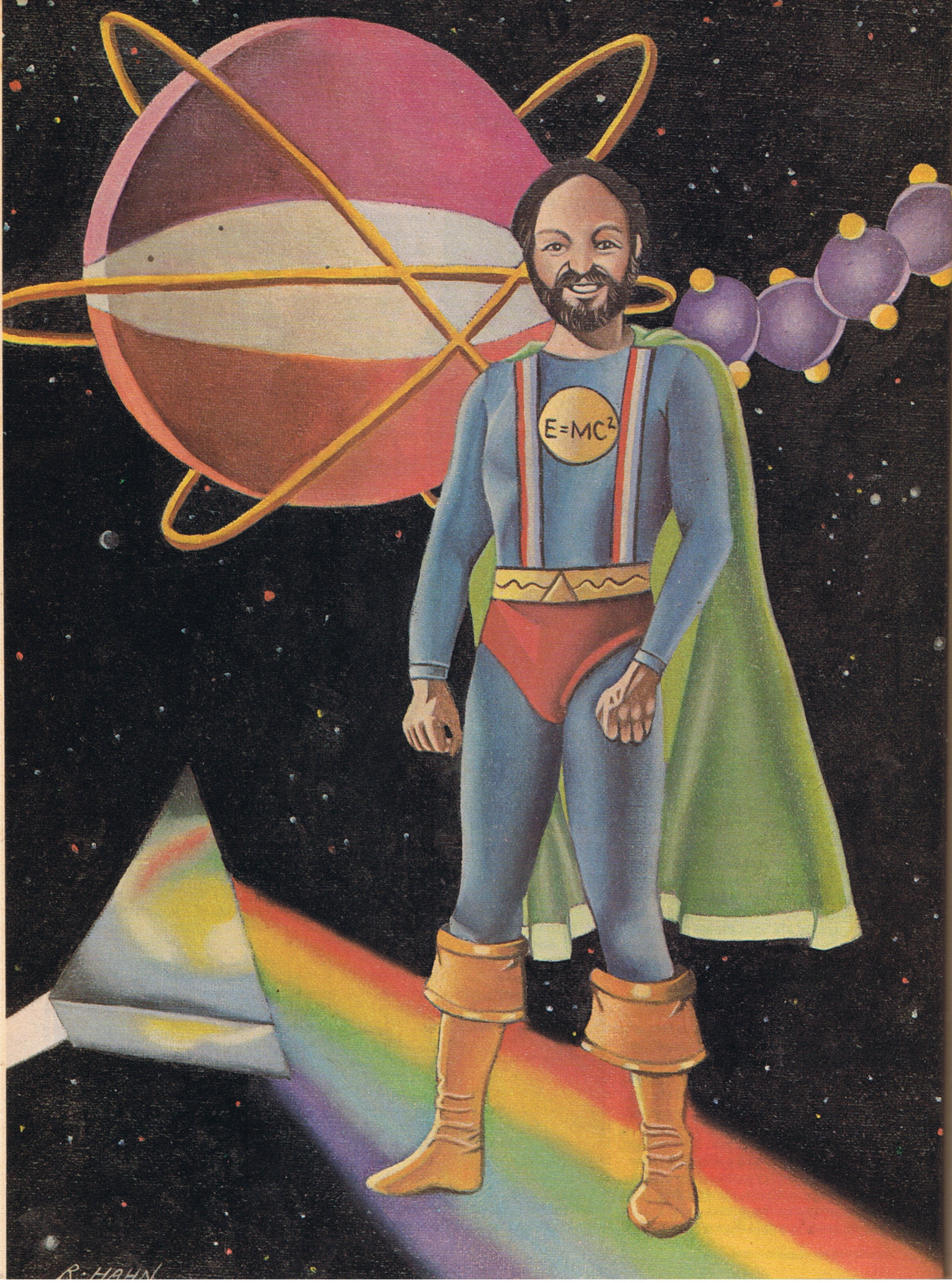
alien rock eater and . . . ."

He catches his breath. "As you can see," he states, "there is nothing heavy about this movie at all . . . unless you want to consider Thor's romance with a machine symbolic . . . which I don't. The whole thing ends happily, though. As Thor is wondering whether it's physically feasible to broach the subject of marriage to his metallic love, Galaxina tells him that all the necessary apparatus can be ordered from her parts catalog!"

Sachs flashes a quick smile. "I told you the movie was pretty bizarre!"

With *Galaxina* due to be released during the late summer, does its creator have any words of wisdom for future *Galaxina* gawkers? "The key thing to remember," he says seriously, "is that the story is about normal people thrust into abnormal situations . . . except in the case of Avery Schreiber. He's an abnormal person thrust into an even more twisted situation."

Again, the chuckles turn to laughter. 



**F**red Alan Wolf used to be a physicist. When not teaching at sunny San Diego State, he gave lectures at places like the University of Calcutta and Tokyo U. He was a consultant to corporations like General Atomic/General Dynamics and Avco Everett. He published articles in the scientific journals and co-authored a popular book. His heroes were Albert Einstein, Niels Bohr and Richard Feynman. If he didn't formulate a workable unified field theory, at least Fred Alan Wolf never had to take a job in a patent office to pay the bills. If you picture a professional career as something along the lines of a mean, ten-page written test, Fred Alan Wolf, PhD had every hole punched and every blank filled in. On top of that, he was good-looking, trim and articulate, more like the sharp account executive of some West Coast ad agency than a head-in-the-clouds theoretical physicist.

But now Fred Alan Wolf is . . . Captain Quantum.

Some superheroes make their debuts with a single act of daring—a man in a blue suit and red cape saves 15 people from certain death in a falling helicopter and the newspapers ask, “Who is that masked guy?”—and Captain Quantum was no exception. He walked onto a stage in Los Angeles one evening not long ago to face an audience of 2,000 people, most of them waiting for the first L.A. appearance in ten years of Timothy Leary. Wolfe wore colored sneakers and a T-shirt, clothing that did not look like it belonged in the same room with a well-known physicist/teacher/consultant. And the Captain began to talk to this audience about energy levels and sub-atomic particles and all this hard science jazz . . . this audience of Leary acolytes who were waiting to hear one-liners about Soviet New York and how Californians represented a new stage in evolution. Suicide.

Captain Quantum got away with it. He cut his physics with jokes and skits. He brought a pretty female assistant on stage and, in the flickering light of a white strobe, tossed a beach ball back and forth with her, to show that a simple movement could be strange and new if you only looked at it differently. He did a magic trick, adjusting his “time machine” on one side of the stage in full view of the audience and appearing almost simultaneously on the other side. The crowd laughed and went along. This wasn't the old chalky blackboard physics they'd learned to hate. “The universe is dying and being re-born every second,” Captain Quantum said. All right!

“That was the first public appearance of Captain Quantum as a character,” Fred Alan Wolf says. “It was my first attempt to communicate the ideas of quantum physics to a large mass of people in as simple a visual fashion as I could.”

Quantum physics? “The theory that energy is not a smoothly flowing continuum but is manifested by the emission from radiating bodies of discrete particles, or *quanta* . . .” says Funk & Wagnalls. It explains how light can be both a particle *and* a wave. Looking at it another way, it's the

digital view of the universe as opposed to the analog view. “Quantum physics says that the world is spontaneously re-created every instant,” Fred Alan Wolf says. “*You* are the source of that creation.” Forget linear thinking . . . jump! “Make intuitive leaps. That's the kind of thinking that will make the 21st century possible.”

To help make the 21st century possible in his own way, Fred Alan Wolf has become Captain Quantum, and is developing a series of programs for television “to encourage that kind of innovative thinking.” His personal appearances, spiked with illusions, optical effects, magic tricks and audience participation, may be booked through Future Presentations (1000 Westmount Drive, Suite 128, Los Angeles, Calif. 90069, 213-652-3039). He has a new book, *The Conscious Atom*, due from Harper & Row this year. He is co-author of *Space-Time and Beyond* (Dutton, 1975) and is writing yet another book, this one for children. It's called *The Jumping*



PHOTO: FUTURE PRESENTATIONS

# Captain QUANTUM PHYSICS SUPERHERO

**In which a not-so-mild-mannered  
scientist takes his entertaining  
show on the road to communicate  
the far-out thinking now taking  
place in the lofty environs of  
modern day theoretical physics**

By MICHAEL CASSUTT

Youniverse.

Captain Quantum—Fred Alan Wolf—was spontaneously created in this youniverse by human parents in Chicago. He got interested in science when he was ten years old. “The first atomic bomb had been dropped on Japan, and there was a kind of aura attached to the image of a scientist at that time, and it was very attractive to me, just like the image of a rock star might be attractive to a young person today. For me it was the scientific image—I mean, the atomic bomb was just an exciting idea. All this huge power! How did they control it?”

“I didn’t want to build a bomb—that never really interested me. But just the fact that there was such a thing as atomic energy intrigued me. What is energy? The terminology itself intrigued me.”

joyable thing . . . I still wanted to go to school. I was still curious, I found the student life to be very idyllic—other than the fact that you get horny, which is the unfortunate aspect. The rest of it was very nice.

“There was an opportunity for me to go to graduate school and get paid for it at the same time. So I went to UCLA. I lived not far from Westwood—Los Angeles was not so smoggy at the time—and I was getting paid by Hughes as a Master of Science Fellow—all my books and tuition paid for—and I would work 26 hours a week for Hughes on salary. That work, however, was considered secondary to my schooling.

“And when I decided to go for my PhD my thesis advisor was going to be out of town for a year, so I said, ‘How about letting me go up to the Lawrence Radiation Lab at Liver-

to learn and see.’” He returned to San Diego and taught for two more years, “but I really wasn’t into it.” It was time for another quantum leap. “I went to Paris, and met the person who had a major effect on my life—an ancient caballistic master . . .”

Caballistic master? Well, how far is it, honestly, to jump from the uncertainties of Heisenberg’s principle and ghost particles and collapsing (or is it expanding) universes, to ancient Hebrew mysticism? “I was in Paris and my friend Bob Tobin sent me a book called *The Cipher of Genesis*. It was about the Bible as a code. Well, it didn’t get me too excited, but Bob had said, the man who wrote the book lives in Paris, and if you find anything at all interesting in the book, I’d like you to go see him. Meet the man, talk to him.” The master’s name was Carlos Juarez. “He was a man who had devoted his entire life to uncovering mysteries when the rest of the world was saying No, no, no. He was 84 years old when I met him.

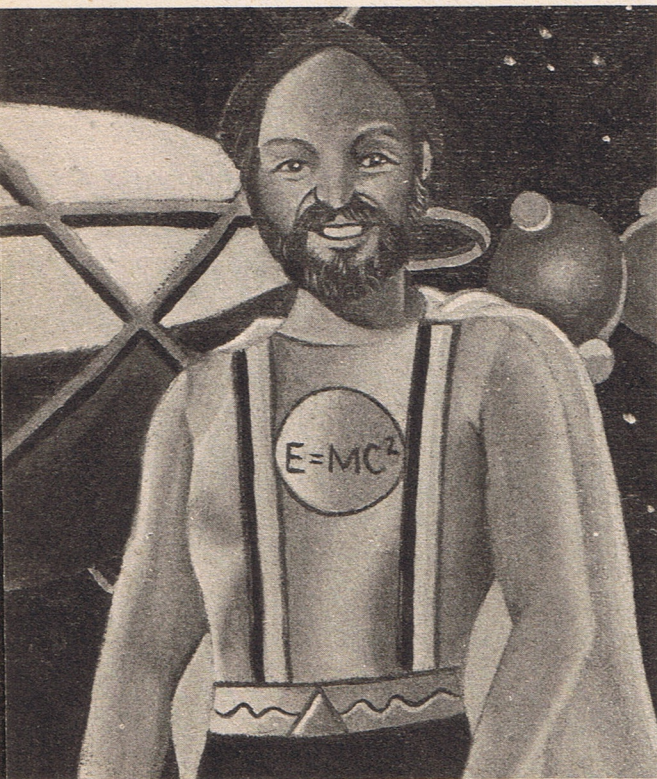
“He opened my eyes to a new way of perceiving physics, and it was through that that I began to expand my feelings about what I could do with my life. I didn’t just want to go back to teaching university physics again, I wanted to try something far more risky . . . in a professional and personal sense.

“This may surprise you, but physics is such a rigid discipline, and I was so well schooled in it, that I don’t think I ever had any insights. But when I was with this man for just a short time I got a flash. It was the first time it had ever happened to me. It was mystical in a way, but I began to see mysticism not as something for books, but as a practical way to enhance your creativity. It opened the door. I began to look at physics differently, to write. I began to bridge the gap between strict modern physics and psychology.” Fred Alan Wolf, PhD, came back from Paris. And quit.

He admits that he “lost associates” over that move, “people who consider it sacrilegious to leave a tenured position.” He has criticisms: “When science stops being creative, it’s just engineering. I felt that the academic world was stifling its most creative talents. Oddly enough, the industrial environment is not nearly that bad. The academics, when you discuss the introduction of new ideas, say, ‘Oh, of course we welcome that.’ But the moment you step outside certain parameters they cut you off. The industrial community is quicker, these days, to accept and encourage innovation.” But he is not bitter—far from it. He learned that, indeed, the risks could pay off, that you could live by your wits alone.

“Lots of kids today are making the mistake of toeing the line because they want a job. I say, forget your job, forget that line. You’ll create jobs for other people. Now is the time when new ideas are needed more than at any time in history . . . So I would say to people, if it’s in your heart to do something, go for it.”

That’s the lesson of Fred Alan Wolf. And Captain Quantum? “It’s the same message—that even the atoms themselves are willing to dance new dances.”



**"Quantum physics says the world is spontaneously recreated every instant. Forget linear thinking. Make intuitive leaps. That's the kind of thinking that will make the 21st century possible."**

Quantum leap to college. “In high school I had never found physics class exciting, but when I looked over the college curriculum I got very bored with the idea of history or government or business or writing, as compared with the study of light and classical mechanics and magnetism . . .

“When I graduated I had no problems getting a job. People who graduate from school today have no idea what this was like, but interviewers would come to you with questions like, ‘Would you like to work for us? How much would you want to make?’ They’d make an offer, and I’d play games. ‘Well, I’d like another hundred dollars a week.’ Then they’d go away, and come back, and we’d go at it again.” From college, the University of Illinois, Fred Alan Wolf went to work—sort of. “Work never looked to me like an en-

more?” Sure enough, they sent me up there, and I got paid three times what I had been getting as a graduate student, to work on my thesis. So it was just one soft pillow after another.”

Up to this point Fred Alan Wolf’s career is much like that of any bright young physicist in the post-Sputnik age. But there were some hard lumps in the soft pillows. He saw assassinations and social upheaval, and it disturbed him. So he dropped out for a year.

It was, for a professor, an orthodox and accepted way to drop out. “I took a year’s leave of absence and went around the world. And during that time I saw things I had never had the opportunity to see before. I lived in Jerusalem for five or six months, I was in Tokyo, Bangkok, I spent some time in Germany and France. It was a remarkable chance

## Rat Traps and Solar Power Satellites

The first solar gadget I ever saw was a set of five mirrors my grandpa first used to cook hot dogs back when my mom, Marjorie, was a kid. Marjorie moved up from solar hot dog cookers to telescope lenses and, in the process, married another astronomer, my dad, Aden Meinel. In 1966 they made the first of a series of trips to India to help construct an observatory. On their way over Aden and Marjorie smuggled some rat traps to Roy and Alma Hagan, who lived in the Indian Himalayas.

Rat traps are a forbidden technology in India because it's wicked to kill cute fuzzies. The food these cute fuzzies eat and contaminate would provide a decent diet for all that nation's starving people.

The Meinels and Hagans became close friends. Eventually Roy and Alma convinced Aden and Marjorie to visit a leprosarium they and some friends ran in Nepal. It was located on a cold and foggy slope, and because firewood, oil and coal were all scarce, the Meinels and Hagans and lepers all did a lot of shivering. One morning Marjorie woke up with the realization that soon we would run out of all our fossil fuels—and unless we develop a renewable alternative, some day nearly everyone in the world will become as bad off as those Nepalese lepers.

That was 1970. The Meinels flew back to Tucson, Arizona and began running solar power experiments, wrote a textbook (*Applied Solar Energy*, Addison Wesley, 1976) and began giving lectures to everyone who would listen. Their message: Cheap, clean, abundant energy is the key to human freedoms. The freedom to be warm. To grow and cook food. To travel wherever you choose. To have hope for the future.

In 1973 I scheduled a lecture for Marjorie before the Tucson branch of the Peoples' Party. I figured that since they were battling the oppression of farmworkers, racial minorities and women, that surely they would leap at the chance to support a technology which can uplift the downtrodden. After all, where would we women's libbers be without the washing machine?

Marjorie showed them a number of technologies whereby solar energy could be harnessed to provide 24-hour-per-day, all-weather electrical power on a large scale.

They were horrified. Giant solar power plants out on the desert weren't at all what they wanted. "But—we must destroy the utilities!" "It's not fair to bail out the energy wasters—they've been burning all the oil, now they've got to suffer the consequences." "I'm against solar energy because it might make the Meinels rich."



If these people have their way, we needn't fear (horrors) anyone getting rich off solar energy. The kind of people who defend rats as cute fuzzies while they ignore starving children are also waging war on every technology that holds a promise of providing cheap energy for everyone. Their idea of the good life is for us all to live like those lepers on a Nepalese mountainside. They call it decentralization. The simple life. Mom and I call it crap.

In 1975 I worked as a consultant at NASA/Ames Research Center on what may be the most promising solar technology of all: the solar power satellite. Out in space sunlight shines 50 percent stronger than it does in the middle of the Sahara, and it shines 24 hours per day. A solar power satellite would collect this energy and beam it down to Earth via microwaves. Our research team got really excited. "Space can solve the energy crisis!"

Later, as president of the L-5 Society, I provided information on solar power satellites to dozens of reporters, mostly friendly. One day I got a postcard from Adam Hoch-

schild, an editor of *Mother Jones*, asking for information on the concept. Knowing that Hochschild was spiritual kin to those Peoples' Party ideologues who would rather shiver in the fog than run the risk that someone, somewhere might turn a profit, I tried to disarm him with a little humor. I wrote to him, "If you want to know if solar power satellites can fry migrating ducks, jam radio stations, tip the Earth's heat balance or shoot down airplanes, etc., please give me a call."

He didn't. However, he did call my father and talk to him about power satellites. Then Hochschild sat down before his typewriter and ginned up the second most confused article on space development in media history. (See "Mining the Void," *High Times* 1980 for the record holder.)

According to Hochschild, "The aerospace industry has finally found a way to cash in [horrors! money!] on the current popularity of solar energy—and the result may hit us all with deadly microwave radiation.... An SSPS (solar satellite power station) is potentially a lethal weapon. One critic, Dr. Aden Meinel, Professor of Optical Sciences at the University of Arizona, compares it to a 'giant microwave oven cooking all people, plants and animals caught by the wandering beam.' You don't have to convert an SSPS into a weapon; it is a weapon already. All you have to do is reaim it by a few degrees so that the microwaves hit New York or Moscow instead of the receiving antenna."

I immediately called my dad and read that incredible fantasy to him. "I sure don't recognize it," he replied. Aden had no idea where Hochschild had picked up that roast duck business. Then I remembered that smart um, donkey letter I'd written to Hochschild. He must have half remembered my letter and somehow confused daughter with father. That'll learn me!

I'm not trying to tell you that concern over microwaves is balderdash. People have a right to be concerned over microwaves because research on their possible bad effects on living things is incomplete. One of the major priorities of current solar power satellite research is microwave experiments on honeybees, white blood cells, rats, etc. to determine what, if any, bad effects the microwave transmission of solar energy to Earth could have. (No, these experiments haven't turned up any roast rats.)

Opponents of high technology solutions to the energy crisis and rodent infestations leap to the attack on the basis of confused or just plain wrong information because they simply don't want cheap, clean and abundant energy

(continued on page 74)

# DIGITAL BREAKTHROUGH

Is computerized recording the biggest news  
in phonograph technology since Edison?

By CHRIS KUCHLER  
and  
KENNETH WALKER

**T**he history of recording technology has been fraught with advancements that occur at the darndest of times. Just when the world was getting used to the 78 rpm record, along came the 33½ long player. As the public at large relaxed to the sound of monaural recordings, up popped stereophonic sound. Now, with stereo record albums a permanent member of nearly every home in America, along comes another sound revolution in the form of computerized recording.

Computerized recording is making more of an impression in recording circles than any technological development espoused since the days of Edison. Edison's original phonograph, invented just before the turn of the century, featured wax cylinders and was primarily intended as a tool for taking office dictation. Edison had thought of—and rejected—the idea of recording on discs. It was Emil Berliner, years later, whose introduction

of the disc recording led to its standardization and the subsequent demise of Edison's cylinder.

During this early period in the history of phonograph technology, all recordings—whether on disc or cylinder—were “acoustic.” This simply meant that the recording technique itself was entirely a mechanical process, with no electricity involved. Singers sang (or at times shouted) into the wide end of a megaphone-shaped horn that became known as the “Morning Glory.” The sound waves were concentrated at the small end of the horn where they vibrated a microphone-like diaphragm. The diaphragm was, in turn, attached to a cutting needle which transmitted the vibrations to a wax-coated disc or cylinder rotating beneath it, resulting in grooves containing the sonic information.

This straightforward but limited technique was dramatically improved in 1926 with the introduction of “electrical” recording, which involved microphones quite similar to those in use today. Before the microphone, it had been something of an “act of faith” to imagine that there really *was* an orchestra hiding behind the loud surface noise of early acoustic attempts at reproducing the sound of a full symphony. The new technique, however, freed the performers from the severe limitations of the “horn” and enabled the more accurate recording of larger ensembles. The final product itself still left much to be desired, though, as the entire recorded performance consisted of only four minutes per side of a 78 rpm disc. Nevertheless, the electrical process represented such a quantum jump in the faithful recording of a performance that many current audio buffs are of the opinion that *no* sonic advance—not even stereo—has been as significant... that is, until the recent advent of *digital recording*. Like the introduction of the LP (by Columbia

Records in 1948) and stereo (1958), this new recording technique is rapidly on its way to becoming the industry standard.

Digital recording was quietly ushered in by Denon Records of Japan (a Columbia Records affiliate) in 1972, with its PCM (Pulse Code Modulation) system; but it was not until America's Dr. Thomas Stockham and his somewhat different “Soundstream” digital recorder attracted attention in 1977-78 that the digital era came of age.

Stockham began planning his new computer approach in 1958. He first attracted worldwide attention with his research into the beginnings of recording technology, which resulted in the computer enhancement of original acoustic recordings by tenor Enrico Caruso. Dr. Stockham had successfully programmed his computers to correct the distortions introduced into the old 78s by the

metallic vibrations of the Morning Glory horn.

The digital recorder itself was not long in coming. Within two decades the continuing reduction in size (and increase in processing power) of such computer components as integrated circuits made digital recording a reality. Essentially, all digital recording systems share certain basic characteristics, although the uses of digital technology go far beyond recording. Digital circuitry can currently be found in products as basic to modern life as telephones, television sets and automobiles; and this technology, applied to sound recording, allows reproduction so precise and so dynamic that current stereophonic systems can be damaged if playback volume is not set at an appropriate level.

Even today's best conventional analog tape recorders, using sophisticated noise reduction techniques, are simply not capable of capturing the complete dynamic range of a musical performance (expressed in decibels or "db"), from the loudest louds to the softest whispers. A symphony orchestra at peak volume may generate 100 db or more of sound pressure, whereas the magnetic tape it is being recorded on has a maximum capacity for registering only 60 db (80-90 db with noise reduction). Until now, this shortcoming was considered an ever-present but unavoidable by-product of the tape medium itself, and was simply tolerated. But with the advent of digital recording, such limitations have at last been removed, and absolutely faithful audio reproduction is finally here.

Digital circuits are at the heart of modern computers. They are, in effect, switches which turn electricity on and off, conveying or storing information by the presence or absence of an electrical signal. Most other electronic devices, such as radios, television sets and home tape recorders, rely on analog circuits which transmit information not through the presence or absence of a signal but through its continuous variations.

The same fundamental difference exists between digital recording and conventional

analog tape recording. In analog recording, a studio microphone converts the soundwaves of voices and instruments into a fluctuating electrical signal, which the analog recorder transforms into a varying magnetic pattern on the tape. With digital recording techniques, the same studio microphone is still being used—but where the analog recorder converted the signal into a varying magnetic pattern, the digital tape recorder (DTR) actually measures the signal at very quick intervals (approximately 50,000 samples per second), and converts these almost instantaneous measurements into a rapid-fire string of on-off electrical pulses. These on-off pulses constitute streams of binary numbers ("1" meaning *on*, "0" meaning *off*). Discrete pulses, not varying magnetic patterns, are what actually get onto the tape. This process of converting the input sound signal into a stream of digital numbers is known as digital encoding.

There are two fundamental steps to the digital encoding process: *sampling* and *quantization*. The first step, sampling, consists of dividing the electrical waveform of the microphone signal into this vast number of

precisely equal parts. Each second of sound must be divided into at least 40,000 parts in order to yield a satisfactorily accurate representation of the soundwaves. The Sony system, for example, actually uses 44,000 signal samples per second.

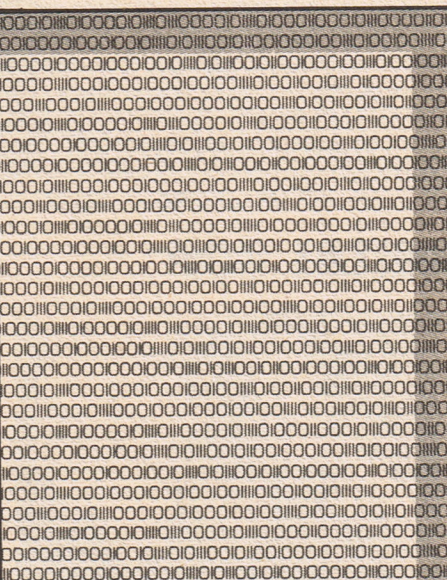
The second step, quantization, involves extremely accurate measurement of the voltage level of each of these minute samples. Each and every measurement is encoded into a particular pattern or stream of 14 to 16 on-off electrical pulses. In the realm of computer language (with which the DTR works exclusively), a "1" represents a pulse, and a "0", no pulse. Thus, if the microphone were to pick up absolute silence, for example, this would be encoded as a stream of all "0"s, while a sound as loud as the digital recorder could register would be a stream of all "1"s.

A computer "word" such as 00101001001111, recorded on the tape as a collection of on-off pulses, would thus indicate a particular microphone signal level at a particular instant in time. What is extremely important here is that the reproduced dynamic range of the music no longer depends on the magnetic tape's ability to encompass it, but rather on the much-less-demanding reproduction of simple on-off pulses, which is easily within the reach of even mediocre recording tape.

During playback of the recording (or decoding of the digital tape), the DTR is able to exactly recreate the music by recalling the binary numbers which were assigned to each sample, converting them back into a fluctuating voltage which *exactly* mimics the original music's waveform. This is a feat which not even today's best analog recorder can match.

The realism of the digital process depends on the frequency of sampling and the precision of the quantization. These parameters can be created and preserved on tape much more accurately than can the magnetic fluctuations used in analog recording. In the Sony and Soundstream DTRs, the string of *bits* (as binary digits are called) is sixteen units long. The increased measurement capabilities of a 16-bit system over a 14-bit one assures that *all* the music's realism and dynamics will be captured.

Digital technology eliminates many of the major problems which have long been associated with analog recording (i.e., tape hiss, wow and flutter, print-through and various other distortions). Perhaps the most irritating problem with analog is the ever-present tape hiss, which becomes more and more apparent with each additional generation copy away from the master tape. This arises from the basic composition of the tape and the manner of its utilization by the analog recorder. The active coating (the oxide) on the recording tape is made up of minute magnetic particles which manifest themselves as a low hiss background. In analog, these random magnetic particles coexist in the orderly particle pattern created during the recording process itself, and are thus



reproduced as part of the playback sound. The lower the recorded signal level, the more prominent the hiss becomes. With digital, however, these random particles, while still present on the tape, are ignored by the digital decoder which recognizes only the completely on or off impulses present on the tape, and nothing more. Thus, a one-hundredth generation copy of a digital tape will sound just as dynamic as the original master recording because it is literally a duplicate set of binary numbers; nothing added, nothing lost.

A further shortcoming of the analog recording process stems from the fact that a music waveform inevitably undergoes distortion-producing changes while being recorded and played back. With even the most sophisticated analog equipment there

are discrepancies when the input signal is being converted into a magnetic pattern on the tape. There is some difficulty in getting a clean, realistic reproduction of such sudden loud sounds as crashing cymbals or booming bass drums. The digital process, however, is capable of accurately recording any sound within and even beyond the range of human hearing.

The reason that digital technology is presently creating new standards in the recording field relates to its truly astounding capabilities, and to its future usefulness: It's not a technology to become obsolete, at least not in the foreseeable future. As long as there are computers as we know them today, digital techniques will continue to be used for information storage and retrieval.

Currently competing digital recording systems, besides PCM, Sony and Soundstream, include those invented by London Records, Victor Records of Japan (JVC) and the 3M Company, with others on the way. These competing systems will gradually merge characteristics until there is only one standard format prevailing, as was the case with stereo. DTR standardization is probably a number of years away but the technological leaps being made in the meantime are awesome. The capability of the newest Sony 1600 device, in comparison to earlier models, is like the difference between night and day, while Soundstream is reportedly working on an 18-bit system which will provide even greater realism and accuracy. Multitrack recording, while presenting a hefty technical challenge, has recently been brought onto the market by the 3M Company.

The times ahead will be exciting, as record buyers will be able to hear music in their homes which ever more closely resembles that of the recording hall. As is usually the case with great technological breakthroughs, the general public will be the greatest beneficiary as the competing systems jockey for superiority. There will, of course, be constant refinements in digital technology; but there is no doubt that this is one of the rare cases where the old adage, "The future is here today," is true. It's just not finished yet. **E**

## DOING THE DIGITAL BOP

The digital revolution hit the pop music markets very quietly in 1979 with the release of Warner Brothers Records' *Bop Till You Drop* by Ry Cooder, the first multi-track pop album to be digitally mastered by a major recording studio. Although the record was released acoustically, the actual recording was done with digital equipment. "For the first time we heard back exactly what we played, instead of noise," Cooder says of the sessions. "We heard each little sound perfectly. Little nuances were suddenly there. Things that I've been after for years were there. You'd hear your playback equal to what you thought you heard on the earphones. Digital tells you exactly: if you played well, the voice, all that energy, the space. The old analog machine has no room sound and ambiance at all. It's flat."

Being the first to record a rock record digitally did present some problems, however. "The digital gear fried bacon half the time," Cooder laughs. "For hours we'd sit there, the technicians and musicians, looking at it. Finally they discovered that the playback heads were the problems. If they'd known, they could have taken the synch heads when they wanted to overdub. But the 3M guys didn't know that and they had made the equipment. Finally, halfway through the record they realized what was wrong. That speeded things up quite a bit. But our



engineer Lee Herschberg would sit there punching this thing, saying 'What the hell is it going to do this time?' Sometimes it would eat up a whole drum part. It got to where Jim Keltner couldn't play a note without the thing refusing it. It seemed it was out to get him. And it was like that sometimes. Good days and bad days. I'd come in there and the hood would be up on this digital thing and all these guys would be peering down into it and not knowing what they were looking at."

Cooder's *Bop* long player became a digital pioneer for a second time six months ago when the creative people at Warners and Sanyo Electronics merged. Under their agreement, WCI Home Video manufactured copies of Cooder's LP using a process that encodes digital audio data onto the video

track of a Beta-format video Cassette. The LP was offered as a premium to purchasers of Sanyo's Plus 10 digital audio adaptor and is currently being used to demonstrate the device at Sanyo retail outlets.

According to WCI Home Video National Sales Manager Rand Bleimeister, the concept was initially developed to demonstrate the effective use of video cassettes in encoding digital audio data. The LP's original digital masters were transferred onto the video track of a video cassette—the video track being used instead of the audio because of the huge number of digital information "bits" (over 1.2 million per second) employed in this computerized process... specifically for the Plus 10 PCM Digital Audio Adaptor.

The Audio Adaptor is a signal processor that converts a stereo audio signal, such as the one generated by conventional analog home systems, into a digital code that any video cassette recorder can record in the same fashion that it does a TV program. Placed between any audio system and a home video cassette recorder of any format, the Plus 10 records and plays stereo programs of a quality far beyond that of conventional analog recording systems.

Bleimeister of Warners points out that now, with the Warner/Sanyo program, digitally encoded software will be made available to the public for the first time in its original form.

Today Ry Cooder... tomorrow Root Boy Slim!  
—Ed Naha

# Ellison

(continued from page 27)

it was a terrific conception. We had our meeting at Universal's Black Tower on Friday, August 3rd, 1979. And I pitched the combined concept to Saphier. He seemed interested.

He took the two books and said he'd read them, and then we would meet again. When we left Universal together, George was like a kid again. He was up, he was ebullient, he saw a chance emerging. And I dashed his hopes by saying that I was so tied up with commitments that I wouldn't be free for perhaps a year. He smiled. Gentleman to the end, he smiled and said, well, we'll see... maybe you'll get finished sooner than you think. I smiled back, but I knew it couldn't be. But I didn't want to hurt him. But I didn't want to feel guilty. So I smiled and said, maybe, we'll see.

On Tuesday, August 28th George and I met Saphier for lunch at Musso & Frank's Grill in Hollywood. The Universal executive—a better man than I because he was willing to give George the *chance*—said he would be willing to enter into a step-deal of development. But only if I'd be part of the package.

George looked at me, oh God I'll never forget that look, and I think in that instant I saw his future in his eyes. And I didn't say okay I'll do it. I said I was up to my ass in work and was sinking fast and I didn't think I'd be free for six months or a year. And the smile held on George's dear face, but the light died a little.

It never came to be.

We never made the deal.

Universal thought of him as an old man, past his prime, not one of the new wave of hotshot director/producers. He was an ancient stone unfit for splendid new monuments like *Jaws II* or *1941* or *Meteor*.

George Pal died on Friday, May 2nd with his integrity intact, with a half dozen projects proposed and none in work.

He called me on the evening of April 28th, four days after the jury in Federal District Court delivered up its judgment in favor of Ben Bova and me to the tune of \$337,000—final vindication for me in my four-year battle to prove plagiarism on the part of ABC-TV and Paramount Pictures and a man named Terry Keegan. He called to congratulate me, to tell me how pleased he was that we'd won. His suit against Paramount over *The Time Machine* ripoff was still dragging on. He called, because he was a friend and a gentleman, to say he was proud of me, that I'd struck a blow for writers everywhere, and he held me in esteem.

I didn't take the call. I was having dinner with friends and my assistant, Marty Clark, took the call. "Be very kind and gentle to him," I said. "He's a dear man and a friend."

But I didn't speak to him.

And four days later he was dead.

Seventy-two years old, a gentle man with talent to spare right up till the end, who was

shunted aside by those who could have cared a little more.

And I cling to this black rock of self-loathing and detestation of the industry in which I serve my time, and I'm not entitled to cry for the loss of George Pal.

But you are. Because you've lost more than you know. As they say, usually with as much guilt as I say it, his like will never be seen again.

EDITOR'S NOTE: Mr. Ellison has been given a free hand to express his opinions. If you don't like what he says, it's not our fault. If you really love his column, we'll take full responsibility. Publishing is funny like that. The content is copyrighted © 1980 by The Kilmanjaro Corporation.

## Battle

(continued from page 32)

"but sometimes we were ready before they were. The first day I was at the controls of my spaceship I was sitting there with no buttons to push and no lights on my panels. We faked it a lot."

"All of us knocked ourselves silly pulling this together," Murakami injects. "I was so exhausted at the end of a day, I couldn't even start my car. I was petrified of driving home. We were dazed a lot of the time. By the time we were ready to shoot a scene at three or four in the morning, everyone was punchy. The camera crew couldn't really see through the lens. They couldn't be sure about the focus and stuff like that. Then Richard Thomas would start going crazy. He'd start pulling stunts like just falling down in the middle of takes for the laugh. He was wonderful. We were pretty wacked-out and we'd just laugh at these dumb things. It was such hard work, it was the only thing left for us to do."

After six weeks of shooting ("Six weeks and two days," Corman states flatly. "It's the first time I've ever gone two days over schedule."), Murakami and his crew were ready to end their *Battle*. "We had our wrap party on our stage," the director smiles. "It was slated to begin right after we blew up John Saxon's Hammerhead spaceship. We set up a lot of charges within the ship's interior. It took quite some time. We were approaching midnight. If we went past midnight, we were in trouble. It was the last day of shooting. We had John Saxon signed up only until 12 PM. After that, we would have run into double or triple time or something awful. So here we are hurrying with these explosive charges. Roger Corman, his wife and some friends show up for the party and begin to watch us shoot. Roger started getting really nervous. Everyone, the cast and crew, was just standing there waiting for us to finish the movie so we could start the party. With one minute to go, we were still setting up. Roger suddenly started screaming 'We gotta get this shot done by midnight!!' Finally, we got the charges wired up. We set them off and finished the film exactly on time. All the explosives went off perfectly. As soon as the smoke cleared, champagne was poured and we had a party in the debris."

The *Battle* is now over. The weeks and

months of hard work have been distilled into a final motion picture. Finally, *Battle Beyond the Stars* creators and participants can leisurely reflect on the result of their work. "It's well written," says Murakami. "It's very exciting. It's very entertaining. One of the best qualities of the film is the actors. They did a great job. It's a kid's film, I suppose, but there are enough sly gags in there to please older audiences. It has a style that I don't think other science fiction films have had. There's a tongue-in-cheek humor underlying the adventure."


"It's the kind of kid's movie that adults will like," echoes Marta Kristen. "It's sort of like *Bullwinkle*. There are enough innuendos that will go over the younger viewers' heads that adults will appreciate."

Corman is more general in his satisfaction. "I think it's the best picture we've ever made," he enthuses. "And I think it will compare very favorably with the \$20 and \$30 million films. The physical look of the picture is very close to the look of the *Star Treks* and *The Black Holes* but with a storyline and acting that is a bit better. That would be the ideal review for me. That's what we started out to do. We took it for granted that we couldn't out-do the big films in their physical look, but we wanted to come close. Coming close would be good enough in the physical aspects if I could surpass them in the quality of the script and the performances."

After two years of tribulation, *Battle Beyond the Stars* is a reality. True to form, however, Corman is not about to rest on his laurels. (Translation: What means this word 'relaxation?') "There is the possibility of *Battle* becoming the first of a series because *The Magnificent Seven* became the first of a series," he says, "but we didn't make this film with that in mind. I'm currently planning to do another film called *Journey Beyond This Galaxy*. Again, it will deal with a clash of alien cultures. In this one, however, we will go to a completely alien culture. Truly, we'll go into another galaxy and go beyond any connection with our own life form."

"In *Battle Beyond the Stars*, the cultures are all alien but they are all compatible with our human form. They're recognizably humanoid. In *Journey Beyond This Galaxy*, we get involved with life forms totally alien to humanity. Our life form is one based upon our thought processes which are, in turn, based on a pragmatic interpretation of the material world around us. The next film's life form will be more intuitive, more mystical in its orientation."

Corman pauses for a moment, collecting his thoughts and envisioning the future, a process which has, in the past, yielded such startling cinematic excursions as *The Fall of the House of Usher*, *The Masque of the Red Death*, *X*, *The Man with X-Ray Eyes*, *The Trip* and *The Intruder*. "That, at present," he says, a trace of well-earned weariness entering his voice, "is going to be our follow-up picture. It won't be a sequel."

In all probability, it will be tough to produce, overly-ambitious and under-budgeted. It will undoubtedly be a lot of fun, too. 

# Ludek Pesek



DRAWING BY RON MILLER

By RON MILLER

It would take a great deal of courage for any of us to walk out of our country, leaving behind our home and an established profession. This is exactly what Ludek Pesek did in 1968 after the Soviet invasion of his native Czechoslovakia. Taking up residence in Switzerland, where he now lives as a "stateless citizen," Pesek (pronounced "Pesh-ek") has since become renowned as one of the premier astronomical illustrators in the world. From his home in a small town on the shores of Lake Zurich, he has produced in the last two decades an enormous body of work, from portraying the planets for *National Geographic* to surrealist gallery paintings to science fiction novels.

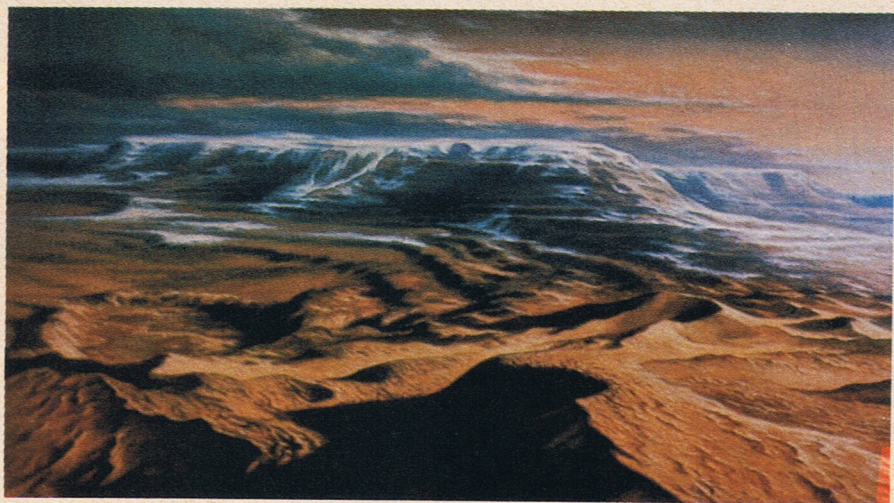
Pesek was born in 1919, and was a romantic from the very beginning. "These traits have always complicated my life," he says. "Twenty-five years ago when my schoolmates started their careers as surgeons, lawyers and engineers, I wanted to climb Kilimanjaro, to cross Africa on a motorcycle, to found an alligator farm in Columbia." He claims to be a little embarrassed to speak of some of his "more exotic projects!" As a student, Pesek found himself bored with physics.

While his professor lectured on the orbits of the planets, Pesek drew lunar landscapes in his friends' notebooks. The mathematics on the blackboard, he says, were too abstract for him. "Fanciful landscapes meant much more to me... it did not occur to me that 30 years later my enthusiasm for extraterrestrial landscapes would become a professional art activity close to my heart." During the late 1940s, he was active as a painter and writer, authoring three novels and winning two European Literary Club prizes. In his own 40s he decided to leave the planet Earth: "My first stop was on the Moon."

Pesek did much research and reading in astronomy, personally observing the Moon for many hours. "My romanticism became grounded on a distant reality." He began sketching the lunar landscape, calculating the heights and profiles of the terrain from the lengths of shadows on a telescopic photograph of the area around the crater Hyginus. "This was the beginning of my series of lunar and planetary landscape paintings." Pesek found it fascinating that he was creating "not a fanciful landscape but one that really exists." He became obsessed with the desire

Opposite page: Two scenes from Earth's early history, with high tides and volcanism.





ART © 1980 LUDER PESEK

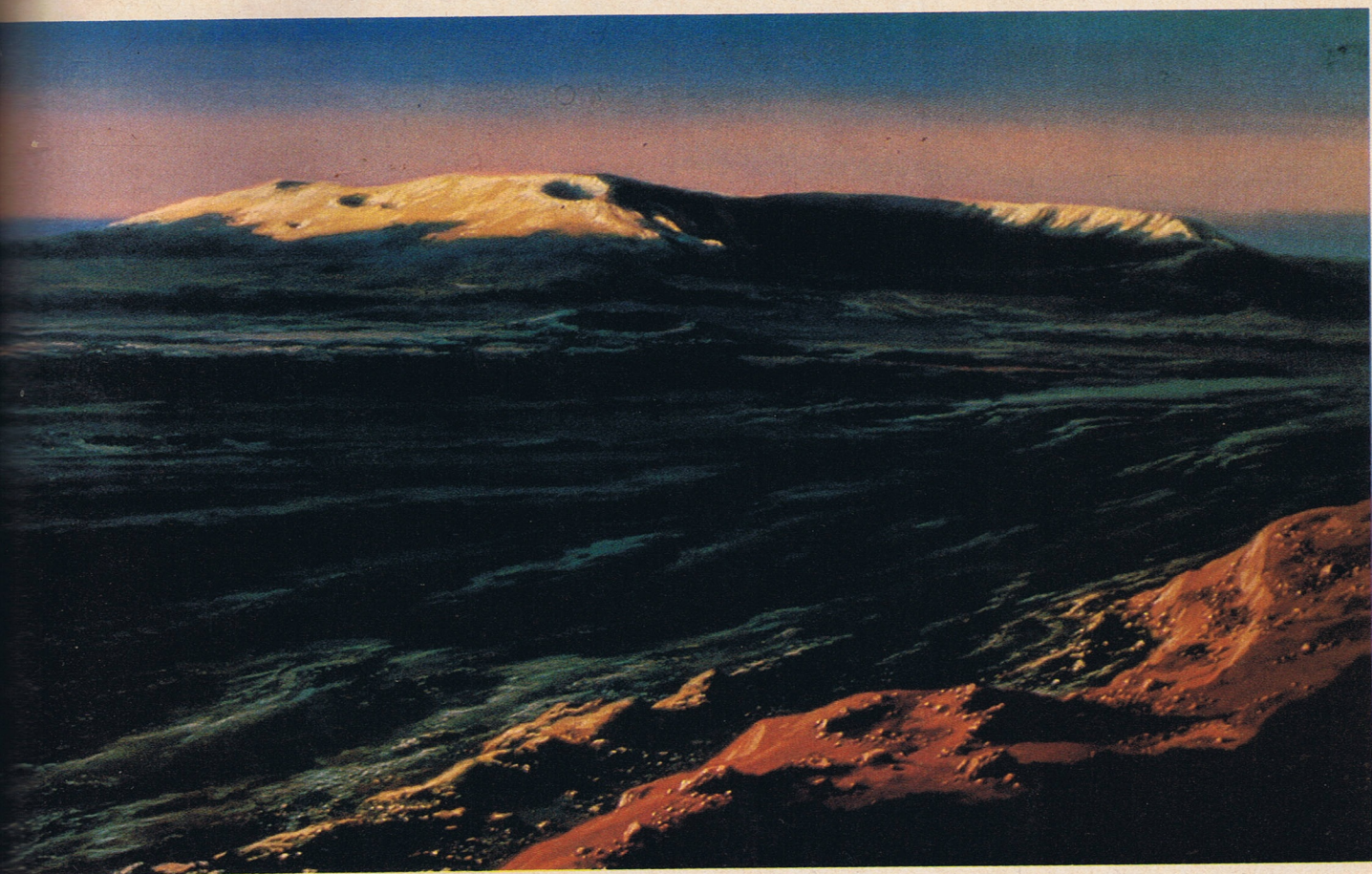


The four paintings on these two pages are representative of Pesek's most recent depictions of the planet Mars, always a favorite subject. More than 40 other paintings of Martian landscapes constituted a one-man show at the Stuttgart Planetarium in West Germany.

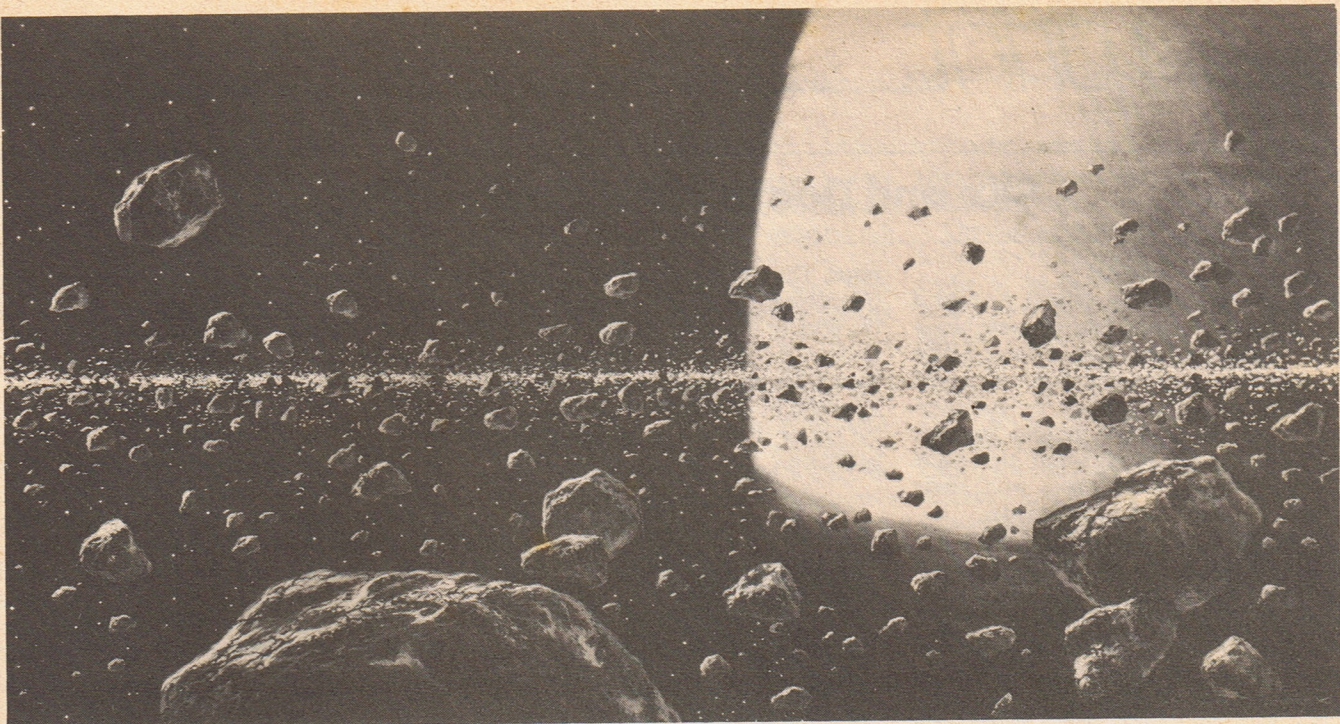
to make these paintings as accurate as possible. He quickly came across a major difficulty, one still experienced by astronomical artists: "Astronomers like to use words like 'perhaps, probably, it is possible, it seems...'" In 1960, scientists were still debating what the lunar surface would be like. Some held that it was a slag-like lava, others that it was dust, perhaps hundreds of feet deep. "I made my lunar landscapes in 1961 amidst this chaos of opinion." Now, when he is able to see nearly first-hand many of the scenes he painted nearly a decade earlier, "I do not feel ashamed of them when I compare them to the photographs taken by astronauts from the Moon's surface."

These first paintings were gathered into a single volume, *The Moon and the Planets* (1963), now one of the rarest and most eagerly sought-after items in the realm of astronomical art. It was an oversize volume with 40 color paintings, most of them double-page spreads, with a few folding out to three pages in width. Nothing like it had been published since the classic Bonestell *Conquest of Space* ten years earlier. Nearly half of Pesek's artwork was devoted to a thorough tour of the Moon, with 17 paintings which have held up very well scientifically. An out-

standing feature of Pesek's approach to space art was evident even in this early volume. This is his matter-of-fact rendering of the planets and their landscapes: they look *natural*, as if they were painted from life. Even his most dramatic views have a blandness about them that make them something more than pure imagination. *The Moon and the Planets* was quickly translated and published in Great Britain, Denmark, the Soviet Union, Japan, Mexico, Italy, the Netherlands and France. The handsome, large-format book won an honorable mention at the 1966 International Biennale of Illustration. He followed this with a photo-book of the natural and cultural wonders of Lebanon and another novel. The latter was a science fiction story, lavishly illustrated by Pesek, called *Log of a Moon Expedition* (although he is personally not a great admirer of SF, in which he finds "little science"). The book was on the list of the ten best European books for 1968. Pesek's second oversize picture book, *Our Planet Earth*, came out in the same year as *Log of a Moon Expedition*. In nearly 40 paintings Pesek traces the history of the terrestrial landscape from its origins in a cloud of dust to the present. The paintings are, if anything, superior to the earlier companion book, but *Our*







Opposite page: A classic rendition of Saturn as seen from its satellite Titan. Above: A Pešek specialty—in the rings of Saturn.

*Planet Earth* did not receive as wide a distribution and today is exceedingly rare.

*The Moon and the Planets* and *Our Planet Earth* were what attracted the National Geographic Society to Pešek's artwork when an upcoming magazine feature on the solar system needed illustrating. Pešek was formally introduced to the United States when the August 1970 *National Geographic* appeared. It had 17 full-color paintings by Pešek. The *Geographic* had flown Pešek to this country to interview astronomers and researchers in order to insure the total accuracy of the paintings—a project he spent more than a year completing. Since that first appearance, he has been a regular contributor to the magazine. For the February 1973 issue, Pešek prepared a half dozen paintings based upon the then-new Mariner 9 photographs of Mars, including one reproduced as a print, in actual size, on the back of an inserted map of Mars. Both these and his other work illustrate one of Pešek's great talents: his ability to come up with unique and exciting concepts and unusual viewpoints. It is sometimes a very difficult thing for space artists to keep their paintings from looking alike, since they all have to work from the same set of facts. In this, Pešek has always been an inventive leader.

With the exception of his gallery paintings, which are usually rendered in oils on canvas, Pešek's illustrative work is done in an unusual combination of media. He paints in tempera, or gouache, on black construction paper. The paper is taped at the corners or sides to a piece of heavier cardboard. He paints very loosely, suggesting more detail than is actually present, often working into the painting later with pencil to enhance some detail or shading. He uses the airbrush occasionally for sky and cloud effects, but once again, usually working over this with brush or pencil.

In the last decade, Pešek has become much more visible in this country. His novel, *The Earth is Near*, is available as a Dell paperback (although it is not illustrated), and he has had a long series of astronomical works published. In collaboration with writer Peter Ryan, he produced for Penguin Books four slim picture books—each with about a dozen color paintings—*Journey to the Planets*, *The Ocean World*, *Planet Earth* (similar, in a much smaller scale, to the classic *Our Planet Earth*) and *UFOs*. He wrote and illustrated his own book on the future of space exploration, *Flug in die Welt von Morgen* (Flight Into the World of Tomorrow) and illustrated a book on the space shuttle. Two major works, in the same scale as his first two coffee table volumes, are *Bildatlas des Sonnensystems* (Picture Atlas of the Solar System—unavailable in English) and *Solar System*, with text by Peter Ryan. The latter is currently in print in the United States. Both are large-scale picture books, containing—particularly *Solar System*—many of his best paintings. *Solar System* has 30 color illustrations, many of them double-page.

Pešek's latest large project has been the il-

lustrating of a massive book on astronomy for the National Geographic Society's Book Services Division. A 250-page children's atlas called *Our Universe* will have, when it becomes available this fall, over a dozen Pešek renderings of the solar system, most of them opening out to a full 10x20 inches. (Many of the originals, as well as other illustrations from *Our Universe* by Michael Whelan, Vincent DiFate, Chris Foss, Syd Mead and Ron Miller, among others, will be displayed this fall at the Earthlight Gallery in Boston, which also sells Pešek's original paintings.)

Pešek has had many one-man gallery shows, including one at the Smithsonian's National Air and Space Museum, which has one of his paintings in its permanent collection. Recently, he had a four-month-long show at the Stuttgart Planetarium in West Germany. Exhibited there were a series of nearly 50 new oil paintings of Mars which are probably the last word in Martian vistas. Pešek has unquestionably raised the genre of space art above mere technical illustration and into the realm of pure landscape painting. And he has carried astronomical art yet even a step further in a suite of surrealist paintings, using lunar landscapes as "backgrounds to earthly symbols of violence and hypocrisy." There are many striking images: in "Presence of God" a medieval cathedral sits in the center of a lunar crater; in another a boulder, in rolling down a lunar mountainside, has stopped just short of a small flower.

"I paint," says Luděk Pešek, "as simply as possible in order to be understood. I am not interested in developing new painting techniques or new artistic visual conceptions... Perhaps, after many years of thinking in terms of extraterrestrial space, I may have lost contact with earthly dimensions but, if I have, I do not suffer from the loss."

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## Sex and Death and Science Fiction

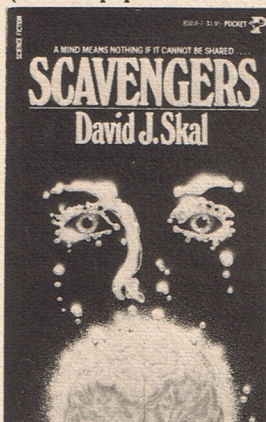
### Desire

**D**r. Freud (among others) postulated that humankind has two great obsessions—sex and death. Science fiction managed to soft-pedal both these topics until the '50s (it wouldn't do to get the readers excited, you know), when authors Sturgeon and Farmer calmly shredded the entire genre's Puritan sexual taboos with *Venus Plus X* and *The Lovers*, respectively.

The taboo against portraying death any more realistically than, say, Sgt. Rock comics fell more quietly, since who wants to talk about death, anyway? Nowadays, though, SF characters die with all the emotional messiness and sheer nastiness to which the six o'clock news has accustomed us.

So, with these basic taboos abating, SF writers have been looking for new ways to get their readers stirred up and some have followed the lead of such mainstream mavericks as Ian McEwan or John Hawkes and are experimenting with a frightening blend of sex and death. If you haven't noticed, I think you'll be shocked at the power that a combination of these twin obsessions yields.

David J. Skal demonstrates that he understands the twisted dynamics of sex and death in his exciting debut novel, *Scavengers* (\$1.95 in paperback from Pocket). The time



is the near future and anarchy reigns. A process has been discovered which renders the human brain into a drug that confers the deceased's memories and personalities upon the drug's user. Users, who call themselves brainstormers,

prowl the streets looking for someone they want to be—someone to shove through a needle. Tracy is a brainstormer. She wants to be anyone, anything, other than who and what she is. Brian is a man who wants the impossible. And Kelly is the impossible thing they both want—a woman artist who's become the brainstormers' drug of choice. Brian has five doses of Kelly and he wants to use them to turn Tracy into his lost love.

This is a story of obsession, death and desire that will shake readers down to their toes. You watch three people wrestle to fit into two lives, and you cannot help but be moved.

*Scavengers* is an amazingly mature first

novel. The style is sure, the ideas and images compelling. The drug scenes alone are worth the price of the book, as they let you watch through the eyes of one possessed, and the book's bloody and triumphant climax rates an award of its own, for here Skal explodes the horror of death into a moment of awful epiphany.

### Pleasure

A more sensational (if not as well realized)



effort is another novelistic debut—Michael Berlyn's *Crystal Phoenix* (\$1.95 in paperback from Bantam). The time is the not-too-distant future and the scene is Bentwell's—a club where people go to kill or be killed for the pleasure of it.

At Bentwell's, angels buy the right to do anything they want to another human being. They just have to pay enough to have their victims reconstructed after it's all over with. Dennis Lange is one of the club's middle men—a highly successful procurer.

Dennis is beginning to have trouble with his business, though. His competition—Freddie and Mara Frank—and his wife want him out of the business, and he's having a little difficulty not thinking about what goes on in Bentwell's white rooms out back.

The business at Bentwell's goes on because most people can afford to either keep up the life crystal that makes it possible for them to be reconstructed, or to pay for reconstruction, but not both. So they update their crystals to the tenth of the month and then let themselves be slaughtered on the eleventh. That way they wake up with a nice new body and no memory of what it cost them. They won't ever know, unless someone tells them.

Freddie and Mara Frank have seen to it that Dennis' wife got a new body after becoming a victim of Bentwell's backroom business, and that he witnessed the gory details. Now he can concentrate on keeping up with business or winning back his wife but not both. Of course, he picks a third alternative—revenge.

Berlyn has come up with a neat little twist on the economics of immortality, and the story has all the ferocity and speed that such a notion needs, but in the end it all boils down to a predictable revenge scenario with lots of rather baroque death-dealing. Berlyn ends up

working so hard for his effects that the reader is left feeling like he's been numbly watching these cardboard characters do terrible things to each other for an inordinately long time. But that's what sensationalism's all about.

### Mortality

It's no surprise that SF took a long time to start dealing with death in a realistic manner. SF has always been a death defying genre. Immortality and life extension have always been speculative staples—getting treatments ranging from Aldous Huxley's extravagant *After many a summer dies the swan* to Norman Spinrad's intense *Bug Jack Barron* to Robert Silverberg's frightening *Book of Skulls*. One thing most books about immortality or life extension have in common is that they deal with the first immortals. Marta Randall's first novel turned all this speculation inside out by telling the story of the final days of the world's last mortal—the story of a lady “growing ungracefully old in a world of the forever young.”

*Islands* (\$1.95 in paperback from Pocket) is Tia Hamley's story. She's going to die and that makes her a freak in her time. It's been about 50 years since she discovered that the



immortality treatments couldn't help her. Now she picks over the bones of the pre-Shaping civilization, looking for clues to how people lived when everyone was mortal.

The Shaping was the accident that created the world Tia

knows. There wasn't any great war here; simple greed sufficed. Many countries needed fresh water so they decided to carve up the polar caps. No one would wait their turn so they tried to cut the whole pie up at once and nearly drowned the world. The parts that were inundated—the islands—are Tia's hunting grounds.

Now Paul, her lover of half a century ago, has come to play at underwater archeology with her and to wonder at the effects of age on this woman he knew. What he discovers in her face and body and what she discovers beneath the sea and in his bed make for exciting, challenging reading.

This novel was first published in 1975, and the 1980 version has profited by a little enlightened hindsight. Almost a third of the book is either new or significantly changed,

but the nature of the book is still the same—it was then and is now a quiet handsome exploration that offers its readers much pleasure, a few surprises and more than one interesting question about which obsession moves in when death is gone.

### Morality

D.G. Compton is a puzzle. He hardly fits the genre mold. His stories are usually dark exercises that explore a moral dilemma in a very mainstream style. The stories, though, happen just far enough in the future to merit the SF label. Compton seems to use the future like a mirrored lens to focus in on the damning effects of contemporary trends.

In *The Unsleping Eye* (\$2.25 in paperback from Pocket), Compton examines the casual

ghoulishness of television and the ultimate media man's attempt to wrest his own humanity back from the little screen.

Rod is the Man-with-the-TV-Eyes—a reporter who's had his eyes replaced with implants rigged for sound and

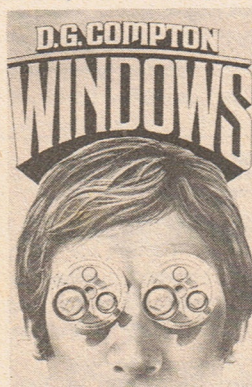
picture. His world is one where disease has been banished and everyone lives just about as long as they want. It's a world hungry for thrills and a TV show about someone young and beautiful dying of natural causes is sure to get great ratings. Katherine Mortenhoe is dying of said causes—a neural overload, the doctor calls it—and the networks are hounding her to let them make her a star. Katherine's response is eminently sane—she runs. She's never had anything she could call her own and now she wants her death for herself.

Katherine flees to the fringes—those people who live on the edge of society, off its leavings—and there Rod finds her. As he watches her and tends her, he sees a woman beautiful in her acceptance of death; a woman growing in her understanding of herself and her life. Rod even manages to think that he's producing something worthwhile and maybe beautiful with those little electric eyes of his—until he sees some of his show while he's standing in a pub. Then he realizes that the camera has no compassion. It can't see the transformation of the dying person, it can only record the failing body. So he reclaims his life the only way he knows how; he stops the cameras and listens to her die without an audience.

This is sometimes a bleak book and there's a lot of anger against the detachment of the

media, but the reader is still moved by how deep within themselves these characters are ready to go, how much they're willing to risk to know who and what they are.

*Windows* (\$10.95 in hardcover from Berkley/Putnam) begins at the same moment



off (spell that wrecked) his cameras, the network abandons him to his ex-wife's care. Thus, the Man-with-the-TV-Eyes is left in the dark, angry, bitter and hurting.

Even as he tries to start his life over, he becomes a symbol to the fringes of someone who tried to change, who tried to make a difference. He is threatened with the role of guru and so he runs to an old friend in anarchist Italy. There he discovers that your heart doesn't have to stop for you to be completely dead.

This man who was once his friend is now a bleak nihilistic revolutionary who wants Rod for his value as a symbol for the revolution. But Rod finds now that he's assured of the love of his wife and son, and he is ready to fight—to say yes to life.

*Windows* is an amazing book. There's almost no action at all, the dialogue is more often enigmatic than understandable, and still a moving story emerges about a family being recreated from the ruins of a relationship and a man discovering the will to keep on trying. This is a story about people meeting the problems of living in the chaotic world of tomorrow and that makes it a rare gem indeed. This is adult SF, and for once adult doesn't mean that the book contains two graphic sex scenes and a little T & A on the cover. This is beautifully crafted fiction and deserves more notice than it will ever get.

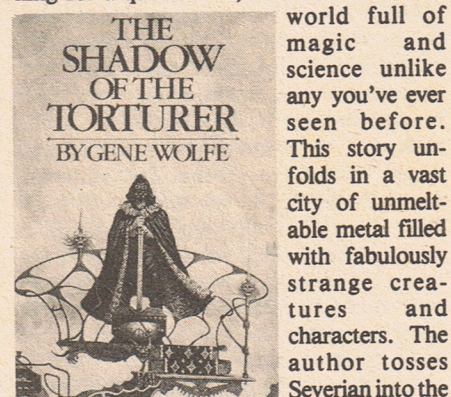
### Torture

Gene Wolfe is another of SF's master craftsmen. He's developed a dark style all his own in over a hundred short stories and novellas, garnering a couple of nominations and one Nebula for his trouble. He's not been known as a novelist, though. *The Book of The New Sun*, a trilogy starting with *The Shadow of the Torturer* (\$11.95 in hardcover from Simon and Schuster) should establish him as one of the genre's best at any length. In fact, the only complaint anyone is going to

have is about how long it takes him to get the entire trilogy out so we can read it.

The time is the very distant future and this is the story of Severian, an apprentice of the Order of the Seekers for Truth and Penitence. Severian is a torturer and hopes to become a master of his trade, torturing whomever the Autarch says to torture, killing whomever he is commanded to kill. But a beautiful and intelligent woman is put into his care and Severian disobeys the rules of the Order. His punishment is exile as a simple executioner in a city far beyond the walls of Citadel, his home since childhood.

This may sound like a very standard beginning for a quest novel, but Wolfe creates a



world full of magic and science unlike any you've ever seen before. This story unfolds in a vast city of unmelt-able metal filled with fabulously strange creatures and characters. The author tosses Severian into the

company of the acting troupe of roughish Dr. Talos and the mysterious Dorcas, a beautiful

woman who appears on the shore of the lake of the dead, and he puts into Severian's hands the miraculous Claw of the Conciliator, a gem that promises to lead him to the throne of the Autarch.

Sound good? I haven't even mentioned the duel with poisonous flowers, the race through the streets to the Garden Landing, the sword *Terminus Est* (Line of Division), or the little kindnesses of the executioner Severian to his victims. This is the beginning of what may come to be one of the very best epics in the genre. Dear Simon and Schuster, do you really have to wait until next year to get the next book out?

### Resurrection


Of course, as soon as other SF writers started playing with death, Philip Jose Farmer moved on to resurrection. *The Magic Labyrinth* (\$11.95 in hardcover from Berkley/Putnam) is the fourth and final volume of the Riverworld saga and the book that all real paper junkies have been waiting for.

For those of you who haven't read the Riverworld series, Farmer started down the river with *To Your Scattered Bodies Go*, a tale that opened with the resurrection of everyone who ever lived on Earth along the banks of a multi-million-mile-long river. In this and the two books that followed—*The Fabulous Riverboat* and *The Dark Design*—Farmer traced the picaresque adventures of

such historical luminaries as Sir Richard Burton, Mark Twain, evil King John, a lisping Neanderthal, Hermann Goering, Cyrano de Bergerac and literally dozens of others.

The quest for the secret of the Riverworld began almost a decade ago and now that it's over it seems almost anticlimactic. Farmer gives us a very big and entertaining battle be-

tween the two great riverboats of Mark Twain and King John, and thins the cast down to a final few who make the last trek up to the source of the river and the heart of the mystery. There they manage to save the world. If this summary seems a little cursory, it's because the book seems so in several instances. But this is the climax of the best-

selling series in science fiction and it does answer most of the questions that Farmer posed in earlier volumes; and so you do have to say—thanks. Mr. Farmer, it was lots of fun, but now that you have the mainstream stories of the Riverworld in print, when do we see the tributary tales you promised us? You have created a lot of addicts out here. 

## Books in Brief

**Songs From The Stars** by Norman Spinrad (\$11.95 in hardcover from Simon and Schuster). In at least one outpost of human civilization which has developed in the centuries since the Big Smash, society resembles a mutant strain of California Consciousness clichés: In the mellow state of Aquaria, sex is open and free, drugs are religion, vegetarianism is the way and karma is all. Low Tech Pop has evolved to a post-nuclear/chemical/petroleum-holocaust extreme. Aquarians follow the "law of muscle, sun, wind and water," and one easy way to break the law is to employ technology tainted with "black science."

So Clear Blue Lou, Perfect Master and itinerant dispenser of justice in the laid-back land of Aquaria, pedals above the countryside in his solar-powered-bicycle-glider contraption, never wondering where the photoelectric cells on his sail come from . . .

Meanwhile, eastward across the wasteland, black scientists—a lair of technology fans who live in air-conditioned complexes and eat hydroponically grown food—have gathered the shards of pre-Smash space technology to mount a holy mission. With a comic and barely probable spaceship called *Enterprise* (maybe it's not *that* funny), the sorcerors plan to return to a centuries-old space station called the Big Ear. Seems they have a tape fragment of the beginning of an intelligent (and entertaining) message from the stars. Naturally they're interested in the rest of the message, which should be stored in the Big Ear's computers.

Black scientist Arnold Harker enlists two of Aquaria's most upstanding citizens—Clear Blue Lou and Sunshine Sue, queen of the Word of Mouth communication network—in the spacers' scheme. Clear Blue Lou's allegiance to the law of muscle, sun, wind and water falters when he's tempted by knowing the Galactic Way; Sunshine Sue's homespun Aquarian values are overshadowed by her desire to activate a global satellite network from the Big Ear, and by the transcendent allure of communication with intelligent creatures from the stars.

What happens when Earth's first space travelers in centuries finally *do* hear the songs

from the stars is a poetic triumph for "gray science," somewhere between nuclear annihilation and growing your own beans. And it's an awfully good story. (Robin Snelson)

**The Life-Extension Revolution** by Saul Kent (\$12.95 in hardcover from William Morrow and Co.) Subtitled "the definitive guide to better health, longer life and physical immortality." Too bad it's not true. This cogent and understandable volume is really a catalog of current knowledge and frontiers of research in the wide variety of fields relating to life extension. Even Saul Kent, one of the leading longevity scholars of our day, doesn't yet have the "definitive guide to . . . immortality." But he certainly is up to date on thinking and research in the field. He presents the information he has gathered in short essays with titles like "Immunoengineering: An Approach to Aging Control" and "Reversing Brain 'Death'" and follows up each article with names and addresses of the scientists whose work he is summarizing.

Sorry it's not the definitive guide to immortality, but it is full of (sometimes conflicting) hints about what causes us to die: i.e., smoking is bad unless you want to lower your statistical chances of getting Parkinson's disease.

Four hundred pages plus meticulous references and index. Invaluable—if not the definitive guide to immortality.

(Robin Snelson)

**Panglor** by Jeffrey A. Carver (\$1.95 in paperback by Dell). While neurotic heroes and heroines are becoming rather common these days, they usually become tediously sane by the end of the novel. Author Carver, however, has found a way to make craziness an asset.

His protagonist, a space pilot with the incongruous name of Panglor Balef, has just lost his last job because of "psychiatric incompetence" and is unemployed, bitter and apt to regard the rest of humanity as unreal ghosts. To add to his problems, he is being blackmailed by a large corporation into performing a particularly nasty maneuver: simulating a near-collision in space in order to

force a rival spaceship to become lost in the mysterious no-man's-land that is known as the collapsing-field.

Somewhere in between attacks of paranoia and coping with a weird stowaway named Alo, Panglor decides not to go along with the plan and tries at the last minute to save both the intended victim and his own ship. Unfortunately, he is less than successful—both ships are lost.

Until they land on a strange world that isn't really a world—where fish swim comfortably in air because they believe that they're swimming in water, where if you walk in a straight line, it doesn't insure that you're going to get anywhere . . . just the place for our hero.

*Panglor* is an interesting and different novel. Although the author's constant reminders of just how wacked-out Panglor is do tend to get tedious at times, on the whole it is a fun read. (Barbara Krasnoff)

**SS-GB** by Len Deighton (\$2.75 in paperback from Ballantine). This is a new novel that defies all attempts to file it under the category of a single genre. Len Deighton's *SS-GB* is part alternate universe SF, part murder mystery, part war novel, and totally enjoyable.

The scene is 1941 England—an England occupied by the Nazi forces to which it surrendered two years previously. Top Scotland Yard detective Douglas Archer has grown used to working under German supervision and is relatively content with things as they are—that is, until he is assigned to investigate the death of a prominent scientist who had been working on something called an atomic bomb. Along the way, Archer is increasingly entangled in a complex plot which includes rivalries between branches of the German military, a plan to rescue the King from the Tower of London and attempts to bring a reluctant America into the war.

While the storyline becomes pretty complicated, the reader is well able to follow each turn of events as Archer slowly finds himself becoming less of an observer and more of a participant in events. Deighton's well-written novel can be recommended to the followers of any genre. (Barbara Krasnoff)

# Aldiss

(continued from page 46)

around. Yugoslavia is various, from the Alpine terrain of Slovenia to the lush rolling hills of Macedonia and the harsh mountainsides of Montenegro—it's a country of nothing but landscape. That had a great influence on me, as great as the tropics. In all my novels, Yugoslavia is present in some way. I don't mind that; but I'd like to keep out the poetry.

*What have you learned from cinema that you are able to use as a writer?*

Almost the whole of my art: to think visually.

*One critic has maintained that all of your writing, regardless of genre, exhibits a deep concern with "time." Do you agree and, if so, how do you try to depict time?*

In a way, I've tired of the time theme, treated directly. *Cryptozoic* was my head-on encounter, and when the four Stubbs novels are complete they'll stand as a one-man experience of time as change. I'm thinking about something else nowadays; one day, I'll work out what it is. The definitive exposition on time is J.F. Fraser's *Of Time, Passion and Knowledge*, and there's little a popular novelist can add to such a towering and imaginative work.

*Does writing serve a cathartic value—does it teach you important things about yourself?*

It's easy to become a writer, far harder to stay a writer. There are many evidences of that truth within the science fiction field. The process changes. To begin with, I was hardly up to the task of writing because "I" got in the way of the writing. Difficult to explain, but I felt I knew too little about myself, and so could hardly see my characters clearly. I took a perilous six months off (I was going broke) to write an autobiography, which cleared the decks; then things became easier. At first, I think my short stories were, as you say, cathartic. Nowadays, I'm familiar with myself, and use myself as a lens through which to observe other people.

*Do you enjoy the actual process of writing? Does writing come easily to you?*

Was it Addison or Sheridan who said that easy writing is vile hard reading? The only novel that, as the phrase has it, "wrote itself" was *The Dark Light Years*, and that was mainly because I had a whole spare month in which I could shut myself away and devote myself entirely to it, like a lion gorging its prey. That novel had 16 hours of attention every day, and was fueled by coffee, whisky, and meat pies. Such a convenient situation has never arisen again. And then I had to do a lot of juggling and rearranging of parts afterwards; the revision took longer than the writing. But I generally love the whole enterprise of creating a book. *Cryptozoic* gave me real trouble and was a pain; it is my one exception to the pleasure principle. As you become more experienced, you can see, out of half a dozen themes which you might possibly turn into the next novel, which one

will be most rewarding to spend the next year on. If you choose well, it is bound to be an enjoyable, revealing experience.

*How would you assess your own craftsmanship? What are your chief strengths and weaknesses?*

You think I'm going to tell you? At present, I'm writing a contemporary novel, set last year, and provisionally entitled *Life in the West*. Rather an ambitious title, to match the theme of the book. It is also related to science fiction. I'm always interested in straddling the gulf between ordinary literature and science fiction, not just because few other people work in that area but because I feel the gulf should not be there—it represents a loss to both sides.

*Does science fiction still accommodate your personal and artistic concerns? Do you*

“... Just recently, I discovered to my horror that I don't really believe in aliens. Okay, I like reading about aliens, but should I allow myself to write about something in which I place no credence?”

*ever feel that you've outgrown the genre?*

Your first science fiction stories are most capable of surprising you. The first time travel story—what possibilities it opens to the mind! But writers and readers come up against the law of diminishing returns. It is natural to start preferring good prose to wild stunts. If you don't notice after a few years that Doc Smith's dialogue is geared to 11-year-olds, then you should have misgivings about your own development. This is why we need a wide variety of science fiction writers, not all geared to the simplest possible exposition of heroism among the stars. Heroism among the stars is fine. But it's not the only game to be played, by any means. Science fiction has widened out with its widening audience. For this reason, it retains its excitement. I am more in love than ever with the platonic ideal of science fiction; I wish that it was realized, and that I could realize it, more often. It is a curious question you ask me, "Do you feel you have outgrown science fiction?" I would be sorry if that were so, when, in the United Kingdom at least, I have helped to shape and direct science fiction's growth, by anthologies and criticism as well as fiction; but your readers may like to ponder the fact that my last two collections of short stories—*Moment of Eclipse*, bringing

together what I care for in most of my late '60s work, and *Last Orders*, which brings together what I care for most of my early '70s work—have not found paperback publishers in the United States. They are regarded as "too difficult," "too challenging."

*To what extent does your writing require the reader to make a personal contribution in order to fully appreciate its meaning?*

I don't know. Some readers just want light entertainment. There's plenty of that about. There is also an art of reading, which happily many readers of science fiction have. A reader has to contribute his perceptions to make a book live. You have to have a high opinion of your reader. Experience is difficult to communicate: novels remain a marvelous and personal way of trying to do so.

*As you see it, what should a good novel do for the reader? In this regard, what makes a book come alive for you?*

Even in these hasty days, the good novel is not necessarily the one which opens up everything to the reader at first reading. If it can stay with him, by dint of its quality of thought or feeling or ideas or imagery, it has added to his expanding world picture. If he can come back to it after five years and still find something living in it, then it is indeed a good book. Lots of books need to catch us at a certain period of life; the real treasures are those we can return to throughout life, using them as a sort of touchstone. I have several books of that unusual kind—Boswell's *Johnson*, Kinglake's *Eothen*, Dickens' *Great Expectations*, Hardy's *Mayor of Casterbridge*, and some critical works of which I never tire. After the flash and filigree are gone, the qualities in such books, always difficult to define, but having much to do with the mind of the writer, are the qualities one seeks also in science fiction. I find them frequently in Fred Pohl, Michael Moorcock, Josef Nesvadba, J.G. Ballard, Bob Shaw, Robert Silverberg and especially Philip K. Dick; and, in a younger generation, in Michael Bishop, Greg Benford, Sam Lundwall, Chris Priest, and others.

*Is writing today more your life or your livelihood?*

I don't know. Every year, I become more deeply entranced—there's a good word—with what you can and can't do in writing. I would write in a prison cell or on a desert island—both environments not unfavorable to writers in the past. But I need an income to go on living and supporting my family, and that income derives from writing. Fortunately, I'm not disposed to chase the illusion of the best-seller, so on the whole I am never disappointed if my novels sell modestly. One always wants more readers, but not for income so much as outcome: you hope you have something special they might enjoy.

*What legacy would you like to leave as a writer? Where does Brian Aldiss go from here?*

I try to look on life and see it whole. Of course I hope readers will enjoy the substance in my work—now rather than when my atoms are reassembled in some other guise.

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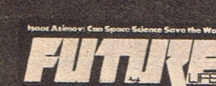
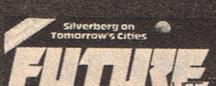
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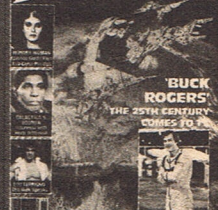
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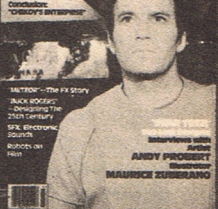
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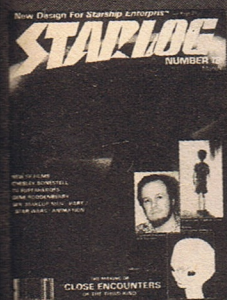
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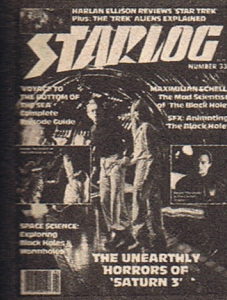
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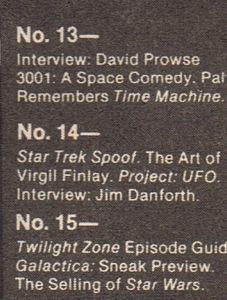
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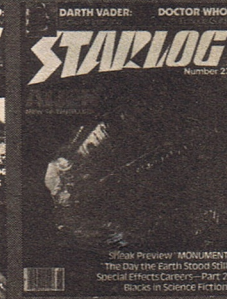
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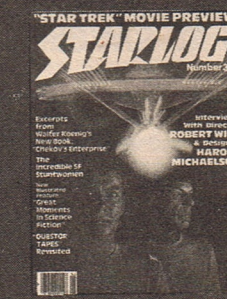
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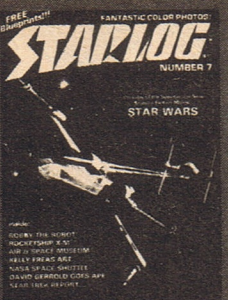
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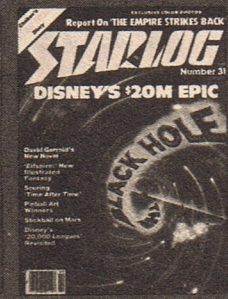
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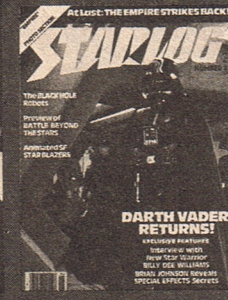
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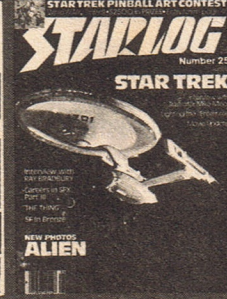
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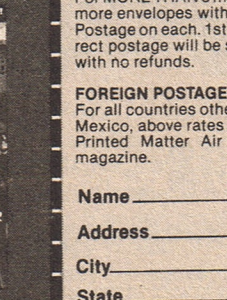
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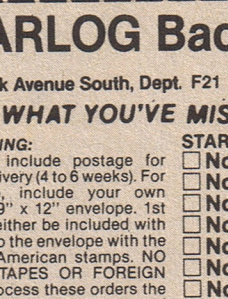
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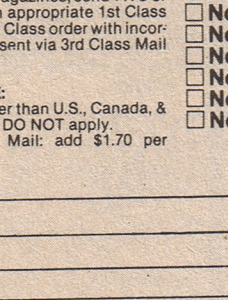
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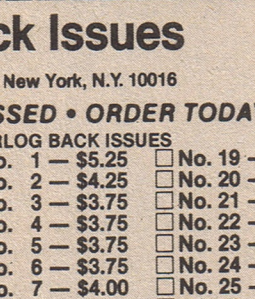
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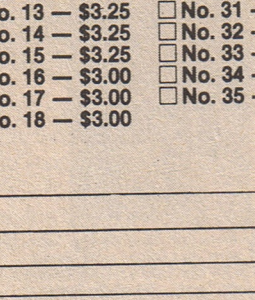
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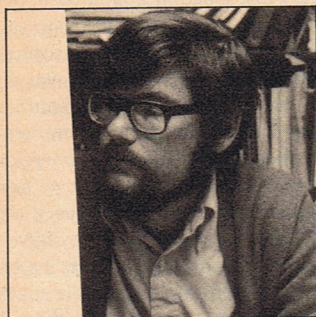
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Gregory Benford is an author well-versed in both science fiction and science fact. An associate professor of physics at the University of California, Benford is best known in SF circles for his critically acclaimed novel, *In the Ocean of Night*. Together with Gordon Eklund, he won a Nebula Award for *If The Stars Are Gods*. Other works by the author include *Jupiter Project*, *The Stars in Shroud* and *Timescape*, the latter to be published this month by Simon and Schuster.

## Aliens I Have Known

By GREGORY BENFORD

Some of our best friends are aliens. At least, that's the way it often seems in science fiction. SF has given us aliens in plenty—to love, to hate, to cuddle, to incinerate. And now that NASA is listening to whispers of radio signals from distant talkative aliens, as well as looking for traces of alien life in our own solar system, we might learn something useful by seeing what freewheeling imagination has envisioned.

The SF author J. G. Ballard once said that one of SF's problems is that it is not a literature won from experience. This is nowhere more true than when we try to depict aliens. The lesson of much SF is that, when we finally do meet them, we will try to project on the alien our own hopes, ambitions and phobias.

The simplest version of this is the invader, usually seen as an implacable, mindless threat, as in Heinlein's *The Puppet Masters* and *Starship Troopers*. In the film *The Thing*, there are even some easy political analogies. The Thing stands for the communist menace. The soft-headed peacenik scientists who try to make contact, despite obvious hostility, represent the Adlai Stevensons. And the U.S. Air Force stands for, yes, the U.S. Air Force.

Peaceful aliens are usually a bit more complex. But even in as odd an environment as Hal Clement's high-gravity world of Mesklin (in *Mission of Gravity*), the natives speak like 1950s Midwesterners, and otherwise react just like humans. A lot of SF has this same biology-is-destiny theme, painting strange worlds, yet the creatures in these places are curiously human, or else remind us strongly of animals we know. Larry Niven's Known Space series is filled with animal-like aliens—for example, the kzinti, catlike carnivores subject to blind rages. His Puppeteers are herd animals, and thus cowards; their cities stink like a corral. This kind of ap-

ALIENS (SOME OF WHOM PREVIOUSLY APPEARED ON CHRIS RUSH'S ALBUM, *BEAMING IN*) ©1980 BY MICHAEL SULLIVAN.

proach can make for handy plotting because the characters are well-defined and motivated. At times using the similarity to Earth animals can go beyond simple ideas, too, as in Poul Anderson's *The People of the Wind*. His birdlike creatures have genuine touches of strangeness and seem deeper, more complex than the usual SF alien.

Even a seemingly radical departure from Earthlike forms can turn out to be only a mirror for ourselves. In *The Mote in God's Eye* by Niven and Pournelle, we meet aliens who are not bilaterally symmetric (an odd variant indeed), and the authors extract some interesting side effects from the feel of threeness versus two-ness. But in the end the aliens seem no more hard for us to understand than the Chinese. (In fact, for me there is an uncomfortable resemblance in the tried-and-true Space Navy method of settling their hash. The Moties are stopped from expanding their sphere of interest by a technical military trick, thus are human values and two-ness saved.)

*Mote* evokes our own experience, perhaps unintentionally, but other SF works use this deliberately. The sexual strangeness of the humans in LeGuin's *The Left Hand of Darkness*, for example, is a distancing device, a way to regard our own problems in a different light. Clarke's story "Rescue Party" uses some aliens who are a dumber version of ourselves. They visit Earth just before it is blown away by a nova, only to find the smarter humans have already set sail for the next star. There is a human-chauvinist thrill in realizing how much we outclass these aliens who thought they would be our rescuers, but for my money this unexamined thrill itself tells us more about ourselves than

we may nowadays wish to know.

This perhaps unconscious reflection of our own problems turns up in the prevalent Galactic Empire motif, with its equations of planet = colony, aliens = Indians (either variety), astronaut = Horatio Hornblower. This is a common unimaginative indulgence of SF—no true aliens, only a retreading of our own history. For my money, this sort of thing wears thin rapidly. I've often wondered if the aliens = Indians backgrounding structure arises from simple lack of imagination, or some deeper unconscious need to dredge up the problem. I wonder how an Asian SF writer would tackle the problem?

The trouble lies partly in the usefulness of SF plots which use simplified aliens as foils—that is, aliens as convenient figures to embody a few character traits, emotions or ideas. (For a pointed example, try Brian Aldiss's *The Dark Light Years* in which aliens use excrement as a sacrament. This stress on the holiness of returning to the soil so the cycle of life may go on mirrors some Eastern ideas, though Aldiss's direct target may be western scatology.)

For me, aliens are more interesting when they are used for something more than horrible enemies, analog humans, handy mirrors or sounding boards. Aliens are *strange*, and that is what matters most about them. Remarkably few SF works consider the alien at this most basic level. Clark's *Rendezvous With Rama* ends with the giant space vehicle leaving our solar system, its essential nature still shrouded. We see the mechanisms, but not the mind behind them. Since Rama and Ringworld there has been a trend to use

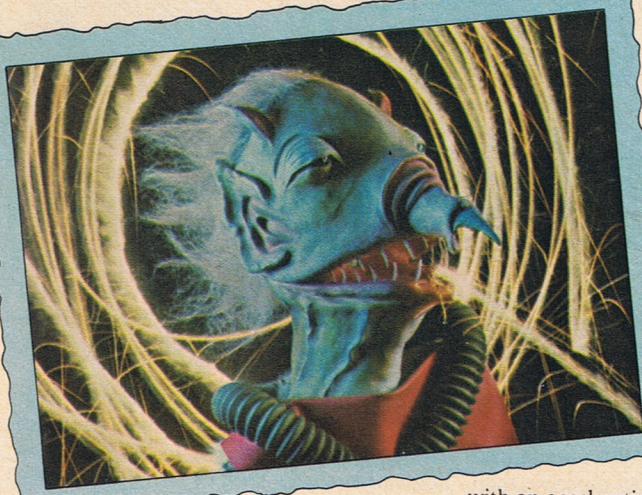


giganticism alone as an easy signifier of aliens, but I feel the method yields diminishing returns. Big isn't always beautiful, alien, or even interesting.

The central problem in treating aliens, then, is keeping a genuine sense of strangeness. It's not easy. In the film *Alien* some scenes were shot explaining just what



the creature was doing and why it kept killing. (The humans were being used the way some insects paralyze their prey and plant eggs inside them. The footage sounds quite, uh, interesting.) These scenes weren't used, though. Why? Because explanation robbed the alien of some of its terror and strangeness. Similarly, Stanley Kubrick keeps saying to people who explain and explain the ending of *2001*, "Don't think about it. Look at it." He *doesn't* mean the ending makes no sense. But after all, anything truly alien, which truly transcends human understanding—the way a spaceship would transcend the ape man's perceptions—will not make sense on a simple "logical" level. So, in a way, one point we can learn from SF is that the relevant question may be: What kind of alien *can* we understand?



We cup our radio ears to hear—what? Messages in simple patterns, most scientists say. Beacons, signposts. But what is simple? The only kind of alien we can find that way is a creature who thinks pretty much the way we do. It must have the same notions of how the universe is put together. It must agree that radio waves are the cheapest way to communicate, and it must pick the same region of the spectrum—near the hydrogen and hydroxyl lines—that we do. Otherwise, we'll miss them.

So we must agree on certain fundamentals of mathematics—that is, of language. In Ian Watson's *The Embedding*, aliens come to barter with us, not for art or technology or doodads, but for our languages. These, they feel, are the keys to knowing the world. By collecting all the galaxy's tongues, they hope they will transcend their species limitations and at last fathom the universe, by adding together all possible descriptions of it. To such creatures radio communication would be a pale substitute for the intense communication they desire.

Similarly, in another visit depicted in *If The Stars Are Gods* by Gordon Eklund and myself, aliens come to commune with our star—and virtually ignore us! Their picture of reality involves stars as spiritual entities, on a plane above us. One man is drawn into this world view, and thinks he reaches some understanding. But in the end he sees himself as boxed in by his own use of human categories, trapped into a fundamental and irreducible ignorance of the aliens. A quotation from the famous philosopher Wittgenstein underlines the point: "A dog cannot be a hypocrite, but neither can he be sincere." Human categories don't apply. The same is true for aliens worthy of the term.

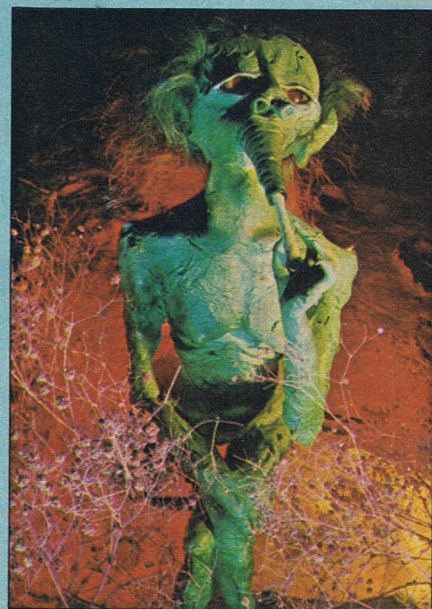
Does this point of view imply anything for our radio listening program? Certainly it means we should not become so convinced by our own arguments that we ignore all other possible modes of communication. I fear that

the program, in search of a well-defined procedure, may lapse into an unverified orthodoxy as the years wear on. We should always keep in mind, while looking at supposedly natural astronomical objects, that some of them might carry telltale signs of intelligent intervention. In fact, the study of a recent odd object, named SS433 for its catalog number, pointed this out. Some early observations showed matter ejected from SS433

with an acceleration quite close to one Earth gravity—just about the desirable rate for be-

ings taking off in a spaceship. Desirable, that is, for aliens living on an Earthlike planet. I remember discussing this with an astrophysicist in Cambridge, England, where I was doing research on extragalactic radio sources. He wondered if SS433 might be an immense starship launcher, harnessing stellar energies. Later the rate changed, for reasons we now think we understand, but the experience was instructive. We notice oddities if they have a human-centered interpretation. That's a beginning—but we may have to be more subtle if we're to tell the natural from the alien. If the acceleration had been a third Earth normal, would the idea have occurred to that astrophysicist? Yet that would have been appropriate for aliens on a Mars-sized world.

One important point SF makes, then, is a plea for open-mindedness. As a simple exercise, let me explore an old idea: space col-



onies. Gerard O'Neill didn't invent the notion of living in space itself, free of planets; SF did. Dandridge Cole advanced the idea decades ago, and now it is fashionable; some say it's inevitable, and they may well be right. Now, suppose aliens long ago felt the same. They might well carry out interstellar colonization in space habitats, rather than fast exploration vessels. Once they arrived at a target solar system, why descend to the raw, hostile surface of the star's planets? You can learn just as much by sending down temporary expeditions. So if anyone has colonized our system, a logical place to look for them is away from the planets. Perhaps we should study closely the asteroid belt, where metal and rock are plentiful in low-gravity environments.

This little idea has some appeal, because it

rests on a specific kind of alien behavior, which we might even duplicate ourselves some day. But beware of the hidden, human-based assumptions in it. (I'll leave to you the making of a list of such assumptions. The important point is that there are undoubtedly some you *can't* list, because they don't look like assumptions to you. But they would stand out like a sore thumb to an alien.)

The most unsettling revelations are those which attack our bedrock view of the world. Some of our thinking about life in the galaxy is based on a very local perspective. For example, science has problems even defining what life *is*, because we have evolved with a very efficient, rapid, life-recognition program built into our instinct. We can tell life, animal or vegetable, instantly; so can other animals, apparently. Evolution gave us this because anything living can be deadly, edible, friendly, or a potential mate—all aspects which are important for continued survival.

But what if beings with longer evolutionary time spans no longer have the same programming? For example, suppose they no longer make the distinction between machines and life. After all, for long-term reliability, machines should be made capable of repairing or even reproducing themselves. Then in a larger perspective, self-duplicating machines function just as if they were "alive"—whatever that means. On a galactic scale, ancient cultures may think of machines as merely a

independent of whether it has life-supporting planets. A smart machine could mine a new solar system, build duplicates of itself, and move on, spreading more explorers in all directions—all without added cost to the original race that launched it. Would we recognize this kind of explorer as a life form instead of a mere robot—and respond accordingly? And what would it think of us—people who hold their machines in bondage, not allowing them to reproduce, given only menial tasks?

Take another inherited attitude: the notion of "now." We go through life estimating what will happen next, and acting accordingly. Similarly, we forget the past quickly, because usually that information is of no use in the long run; we put it in short-term storage, to use computer jargon. This habit of thinking a little bit ahead and forgetting almost all the past gives us the evolved concept of "now." We can think about longer times, but usually this information is useless because either the prediction will be unreliable or more pressing problems are happening "now," and if we don't survive them, there won't be a future. This human perception of "now" contrasts strongly with the ideas of theoretical physics, in which everything—past, present, future—is all laid out in one vast, shining space-time diagram.

What if an alien didn't see "now" but instead, thought instinctively in terms of space-time, seeing long stretches of time, both fore and aft? Such a being might evolve in very static environments, such as planets without changes in the weather, or even in deep space, where moving from one asteroid to the next can take years. This being might react to things as they *will* happen, rather than what *is*. Would this be more efficient? In dealing with us, perhaps not—unless it could anticipate our moves before we made them, on the basis of a solid, clear vision of what we were, are and will be. Such a creature might seem to us like a god, with uncanny insights.

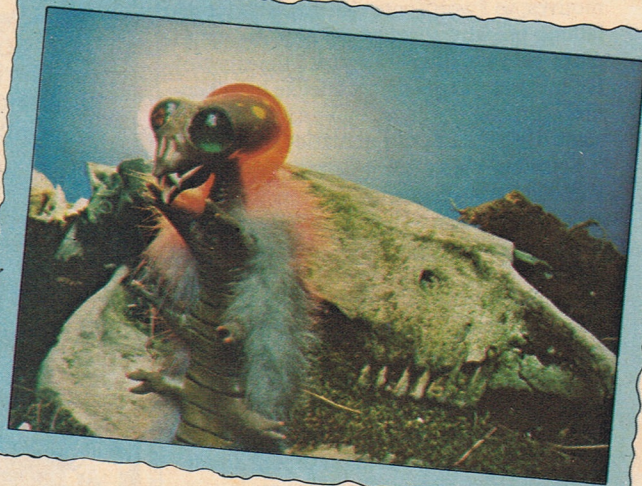
Machines as life forms, future-seeing aliens—these ideas are hard to envision, precisely because they question the very way we look at the world. Once we recognized how different such creatures are, could we make sense of them?

Some SF authors feel the gulf between us and any alien will be so vast that no communication will ever be possible. Stanislaw Lem's *Solaris* is an extended meditation on this. Lem thinks we are forever trapped in our own man-centered biases and worldviews.

The alien is unreachable and our puny attempts are futile, laughable.

Philosophically, this discussion is fascinating. On one hand are the easy answers of most SF, which make for interesting but somewhat superficial plots. On the other is complete loss of contact.

For me, the most interesting ground lies be-



different *kind* of life, capable of withstanding more than the organic variety. Machine-life would be the obvious candidates to explore the galaxy. After all, machines can find raw materials and solar power around any star,



tween these poles. I prefer aliens who can be glimpsed, who can teach us things indirectly, but who don't turn into either complete riddles or simple pseudo-humans in the end. Not only is that intermediate ground interesting for a writer, I think it also points the way for long-range philosophy which can guide the search for real aliens in the real universe—a universe which is complex, various and perhaps fundamentally unknowable, too. E

# Alternate Space

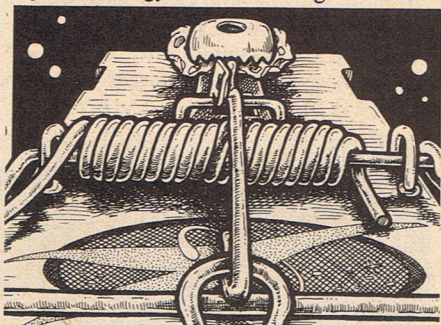
(continued from page 53)

or food.

I don't even pretend to understand my own motives, so I won't entertain you with speculations on why these people are trying to make us poor. But just in case the story of Hochschild and the power satellite hasn't entirely convinced you, let's take a look at what some other friends of the fuzzies are saying.

Speaking about power satellites, novelist Wendell Berry proclaims, "'Energy without guilt' is only a renewal, in space age terms, of an old chauvinism: In order to make up for deficiencies on Earth we will 'exploit' (i.e. damage or destroy) the Moon and the asteroids . . . humans are destructive in proportion to their supposition of abundance; if they are faced with infinite abundance they will become infinitely destructive."

Princeton economist Hazel Henderson pontificates, "I sense some sweeping dismissals of possible biological constraints in such phrases as 'the space colony residents could enjoy a per capita use of energy many times larger than what is now common in the U.S. but with none of the guilt . . . ' It seems to me that in the U.S. we are already consuming more energy than we can digest . . . "



Educator/writer John Holt writes that, "If the space colonies or space exploration research is to proceed, it can probably only be under someone quite a lot like Wendell Berry, someone with a good deal of anguish, a sense of tragedy in him. I can't at the moment understand why such a person would undertake such a work . . . we are going to make worse messes out there than we did in here."

Get the picture? The biggest obstacle to a permanent solution to the energy crisis, whether by building solar power satellites or anything else, are these antitech types who think that you and I aren't good enough to use cheap, abundant power or eat rat dropping-free food. I wouldn't be so worried about them if they weren't getting so darned powerful. These people have managed to recruit Jimmy Carter, who is now trying to cut the solar power satellite program to zero!

What can we do about this problem?

If I had all the answers, I'd be a billionaire sitting in a 20-mile-long space colony having tea with prosperous ex-Nepalese lepers, instead of writing this column for FUTURE LIFE at 10¢/word. So why don't you tell me what our next move should be. I'm serious. Please send me your ideas c/o L-5 Society, 1620 N. Park, Tucson, AZ 85719.

## next issue

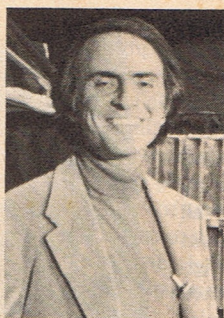


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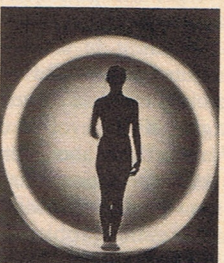
This fall you'll want to plan your schedule around *Cosmos*—a 13-week PBS series which may represent a quantum leap in the quality of science programming on television. Tour guide Carl Sagan—astronomer, exobiologist and perhaps this planet's premier communicator on scientific topics—will lead you on adventures to the edge of the universe, nearby planets, Earth's distant past and even inside the human body and brain. Studded with special effects and filmed on location around the world, *Cosmos* promises to be a fascinating voyage. Meet the people behind the scenes and in front of the camera in FUTURE LIFE #22.



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### SPACE ACTIVISM

Civil rights, the environment, consumerism . . . will the next big social movement in this country be directed toward outer space? If you can judge by the proliferation of space-oriented organizations, it looks like a wave of space activism is about to make itself felt on the national scene. Trudy Bell has explored the phenomenon in depth, and has compiled an impressive list of space activist groups. If you're poised to jump on the space bandwagon, don't miss this thoughtful survey of the grassroots movement off-planet taking place right now.



ART: DYNASHIP

### ILLUSIVE ART

Technology isn't necessarily just for the technical. Last year, James Pelletier startled the passersby of New York City with a new type of "painting": geometrical patterns using the usually random lights of Manhattan's famous skyline. And in collaboration with dancer/choreographer June Anderson, he helped change six modern dancers into seemingly magical beings made up of light and sound. This year, the illuminating "Night/Light" and "Moondance" will both be reappearing along with some new and exciting effects. See them in FUTURE LIFE #22.

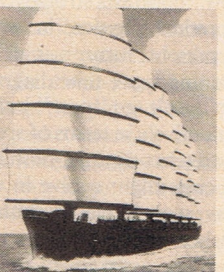


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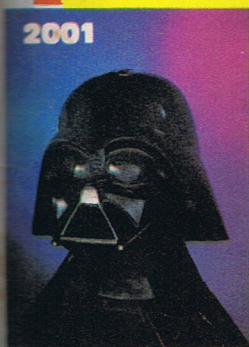
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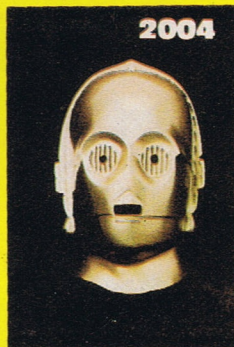
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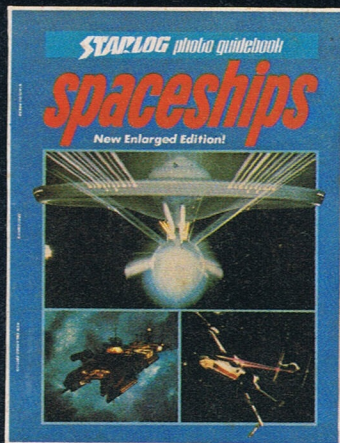
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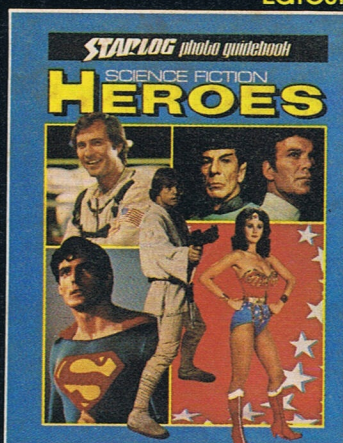
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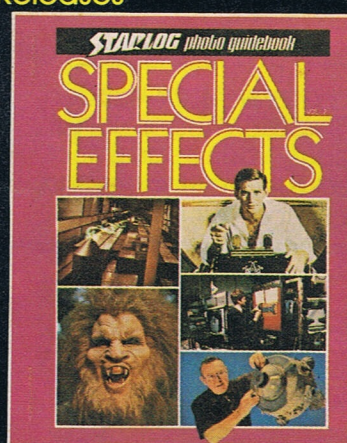
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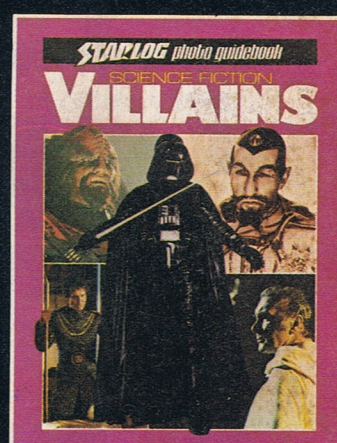
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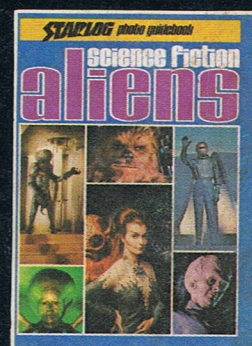
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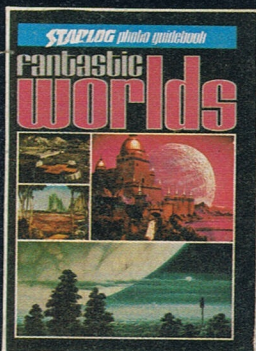
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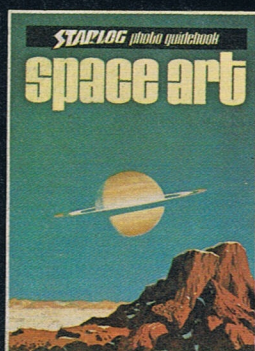
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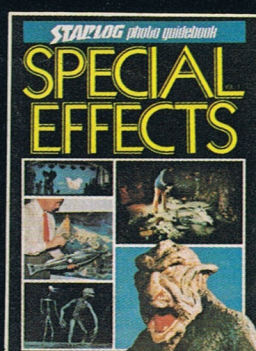
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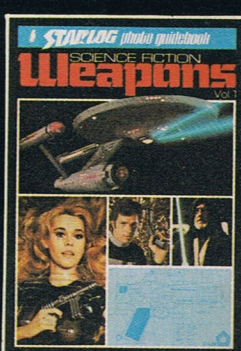
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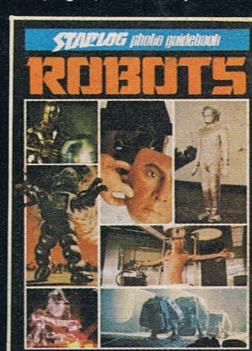
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